United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Ohio Department of Natural Resources, Division of Soil and Water Conservation; Ohio Agricultural Research and Development Center; Ohio State University Extension; Clark Soil and Water Conservation District; and Clark County Commissioners

Soil Survey of Clark County, Ohio

Part I

How to Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

The **detailed soil maps** can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet, and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** in Part I of this survey, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** in Part II shows which table has data on a specific land use for each detailed soil map unit. See the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

A *State Soil Geographic Data Base (STATSGO)* is available for the county. This data base consists of a soil map at a scale of 1:250,000 and descriptions of groups of associated soils. It replaces the general soil map published in older soil surveys. The map and the data base can be used for multicounty planning, and map output can be tailored for a specific use. More information about the State Soil Geographic Data Base for this county, or for any part of Ohio, is available at the local office of the Natural Resources Conservation Service.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Natural Resources Conservation Service, the Ohio Department of Natural Resources, Division of Soil and Water Conservation, the Ohio Agricultural Research and Development Center, and the Ohio State University Extension. It is part of the technical assistance furnished to the Clark Soil and Water Conservation District. The survey was materially aided by funds provided by the Clark County Commissioners.

Cover: A farmstead in an area of Miamian silt loam, 2 to 6 percent slopes.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

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Foreword

This soil survey contains information that can be used in land-planning programs in Clark County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Patrick K. Wolf
State Conservationist
Natural Resources Conservation Service

Soil Survey of Clark County, Ohio

By K.E. Miller, Ohio Department of Natural Resources, Division of Soil and Water Conservation

Fieldwork by K.E. Miller, D.D. Waters, K.L. Powell, and D.L. Brown, Ohio Department of Natural Resources, Division of Soil and Water Conservation

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Ohio Department of Natural Resources, Division of Soil and Water Conservation; the Ohio Agricultural Research and Development Center; the Ohio State University Extension; and the Clark County Board of Commissioners

CLARK COUNTY is in west-central Ohio (fig. 1). It is in the till plains division of the central lowlands province (Major Land Resource Area 111—Indiana-Ohio Till Plain). It has an area of about 401 square miles, or 256,883 acres. Springfield, the county seat, is near the center of the county. In 1990, the population of the county was about 147,548 and the population of Springfield was about 70,487 (Ohio Department of Commerce, 1991). These figures represent about a 1.8 percent decline in population for the county and a 2.9 percent decline for Springfield since 1980. Pike Township, in the northwestern part of the county, has experienced the greatest increase in population since 1980 (9.1 percent).

Most of the county is used for farming. The main enterprises are cash-grain farming and some livestock production and dairying. Urban or built-up land makes up about 12 percent of the county and is expanding at a moderate pace (USDA, 1971). Throughout most of the farmland in the county, a drainage system has been installed in areas of the wetter soils to improve crop production. Most soils are well suited or moderately well suited to field crops, pasture, and trees.

Most of Clark County is nearly level and gently sloping land that is dissected in some areas by small rivers and streams. Wetness is a major limitation affecting the use of many of the soils. The hazard of erosion is generally severe on sloping to steep soils on terminal moraines and along stream valleys.

This soil survey updates the survey of Clark County published in 1958 (USDA, 1958). It provides additional data and soil interpretations and has larger maps on a photographic background, which show the distribution of soils in greater detail.

General Nature of the County

This section provides general information about Clark County. It describes climate; physiography, relief, and drainage; bedrock geology; surficial geology; glacial history; natural resources; farming; and history.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Springfield in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 27.8 degrees F and the average daily minimum temperature is 19.0 degrees. The lowest temperature on record, which occurred at Springfield on January 19, 1974, is -26 degrees. In summer, the average temperature is 71.0 degrees and the average daily maximum temperature is 82.1 degrees. The highest temperature, which occurred on August 21, 1983, is 100 degrees.

Growing degree days are equivalent to "heat units." During the month, growing degree days accumulate by

Figure 1.—Location of Clark County in Ohio.

the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 37.82 inches. Of this, 19.47 inches, or about 51 percent, usually falls in May through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.60 inches at Springfield on June 26, 1971. Thunderstorms occur on about 40 days each year, and most occur in July.

The average seasonal snowfall is 9.5 inches. The greatest snow depth at any one time during the period of record was 22 inches on February 2, 1978. On an average, 9 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 8.0 inches on February 16, 1993.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 41 percent. The sun shines 67 percent of the time possible in summer and 41 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 11.9 miles per hour, in March.

Physiography, Relief, and Drainage

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

The land surfaces of Clark County can be described in five general divisions: (1) the nearly level flood plains and low alluvial terraces of the stream valleys; (2) the slightly higher, nearly level to gently undulating benches or outwash deposits of the glacial valleys; (3) the rolling to steep valley walls, produced either by stream dissection or constructive morainal deposits; (4) the predominantly undulating divides of the general upland level (mainly on the till plains); and (5) the recessional or end moraines and kames that protrude above the general upland level (Schmidt, 1982).

In general, the slope pattern is complex in the uplands and uniform and simple along the larger drainageways. Relief ranges from nearly level to steep, but the land surface is predominantly undulating. Nearly level areas occur principally on stream flood plains, outwash plains, valley trains, and stream terraces and in the uplands in depressions and on flats, particularly on the till plains. Hilly to steep or very steep areas occur most extensively along the valley walls of the major drainageways and on the moraines. These hilly to steep or very steep areas are in Pleasant and Moorefield Townships, in the northern and eastern parts of Springfield Township, and in the southeastern part of Mad River Township. Along the west wall of the Mad River Valley, between the Champaign County line and U.S. Highway 40 and for some distance westward, the topography is rough and steep and has apparently been formed in part by erosion that has taken place since the last glaciation. Otherwise, the topography of the county is essentially the same as when the Late Wisconsinan ice sheet retreated.

The upland is about 1,000 to 1,100 feet above sea level. It slopes gently to the southwest. The highest elevation in the county, about 1,250 feet, is about 2 miles northeast of Catawba near the Champaign County line. The lowest elevation, 820 feet, is in the southwest corner where the Mad River crosses the county line.

Other than a very small area in the northeastern part of the county, which drains southeastward toward the Scioto River, the rest of the streams drain south to the Little Miami River or west and southwest to the Great Miami River. Besides the Little Miami River in the southeast, the major trunk streams include the

Beaver Creek-Buck Creek-Mad River system in the northeast, central, and western parts of the county. This drainage is for the most part natural, except for some channelization in some parts of the Mad River and except for the Clarence J. Brown Reservoir on Buck Creek northeast of the city of Springfield (Schmidt, 1982).

Bedrock Geology

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

Clark County is covered by various kinds and variable thicknesses of glacial drift left behind by continental glaciers during the most recent part of geologic history. Although the drift is more than 300 feet thick in the eastern part of the county, it is quite thin in the southwestern part where both glacial meltwater streams and modern streams have eroded through the drift and exposed the bedrock beneath. Two of these places of exposure are noteworthy. The first of these is the natural Buck Creek Gorge at Cliff Park in the city of Springfield. On this site, the Silurian (Niagaran) Cedarville and Springfield Dolomite (Lockport Dolomite) is exposed. The second is the north-south "manmade gorge" exposing the same rock units, formed by the construction of the four-lane U.S. Highway 68 between U.S. Highway 40 and the Interstate 70 bypass around the south side of Springfield. In addition, older Silurian formations (Euphemia, Massie, Laurel, Osgood, Dayton, and Brassfield in descending stratigraphic order) are exposed just over the southern border of the county along the Little Miami River in John Bryan State Park and in the Yellow Springs Creek as it flows through Glen Helen and west of Springfield near Limestone and Rock Way. Older Ordovician formations are exposed at Huffman Dam adjacent to Wright Patterson Air Force Base in Fairborn, Ohio (Schmidt, 1982).

Surficial Geology

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

The survey area was glaciated more than once. The deposits of an older Illinoian and possibly a pre-Illinoian ice advance, recognized farther south in Ohio, were reworked and covered by a younger Wisconsinan glaciation. These glacial drift deposits covered the bedrock and filled old preglacial stream valleys. The largest and deepest of these buried valleys is known as the Teays drainage system. This system enters the county from the southeast near Plattsburg and trends northwestward on a line through Harmony and the Clarence J. Brown Reservoir and then leaves the county north and east of Tremont City. The depth to bedrock is more than 400 feet along this section of the buried Teays Valley (Schmidt, 1982).

There are two dominant types of glacial deposits that were left in the survey area. The first type is glacial till, which consists largely of clay mixed with boulders, gravel, sand, and silt. This unsorted material is deposited directly by glacial ice. Low, rolling or hummocky topography is characteristic of deposition by melting and retreating ice, which resulted in what is called ground moraine. Till deposited by ice, the terminus of which remains stationary for a time, results in a thicker and higher accumulation. Such topography, which is more contiguous and ridge-like than that resulting from deposition by melting and retreating ice, is referred to as end moraine. The second type of glacial deposits consists of stratified sand and gravel, sorted and deposited by running meltwater from the glacial ice. The most common type of stratified drift is the low, flat outwash plain deposited along meltwater streams (Schmidt, 1982).

Glacial History

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

When the Wisconsinan ice advanced to the south from northern Ohio, a topographic high in the bedrock of Logan County to the north split the ice into two lobes. The western lobe trended down the valley of a preglacial Miami River, and the eastern one trended down the valley of a preglacial Scioto River. Therefore, as the glaciers expanded, ice entered the county from both the northwest and the northeast, apparently abutted, and advanced southward toward the Ohio River. When the glacial ice retreated from the county, it melted away to the west and east as it had entered. Thus the major end moraines resulting from this retreat are oriented in a north-south direction in this interlobate area. The Springfield moraine north of the city and the Farmersville moraine along the western border of the county were deposited by the ice of the Miami lobe. East of Springfield, six end moraines (Pitchin, Thorp, Dolly Varden, South Charleston, Plattsburg, and Esboro) were deposited by ice of the Scioto lobe. These six individual end moraines become less distinct in the northern half of the county and comprise the wide Cable morainal belt.

Two major outwash systems trending north to south also occur in the county. The Kennard outwash system is an older and topographically higher one that begins north of the county and ends at Clifton Gorge. The

meltwater of this system came from the Scioto lobe, and the outwash is associated with the six end moraines deposited by ice of this lobe. In addition to providing the sands and gravels of the outwash, the meltwater also contributed significantly to the erosion of the gorge. The second major outwash system is that of the Mad River and its major tributaries, Buck Creek and Beaver Creek. This entire system is younger and lower than the Kennard system to the east and developed only after the westward recession of the Miami lobe of ice uncovered a topographically lower drainageway to the southwest. The meltwater of this system was probably responsible for forming most of the Cliff Park Gorge in the city of Springfield.

These extensive deposits of morainal material and outwash in Clark County constitute the parent material in which the soils of the county formed.

Natural Resources

The natural resources in Clark County include ground water, bedrock, and sand and gravel deposits.

Clark County has good water supplies to meet the needs of small municipal or industrial entities or for farm or home use. Water supplies are available generally in Clark County, either from glacial deposits or Silurian rock formations. Yields from consolidated rocks of Silurian age do not exceed about 200 gallons per minute and commonly are lower than 50 gallons per minute. Yields from glacial sand and gravel commonly range from about 25 gallons per minute to about 250 gallons per minute (Schmidt, 1982). Yields of 500 to more than 1,000 gallons per minute may be developed in permeable sand and gravel deposits adjacent to the Mad River (Schmidt, 1982). These deposits are primarily associated with areas of Ross, Tremont, and Warsaw soils. Ground-water conditions are poor in areas of eastern Clark County, where fine sands in the buried Teays Valley deposits may yield as little as 3 to 10 gallons per minute. Small areas in the southwestern part of Clark County, where thin, unconsolidated glacial deposits overlie the interbedded, nonwaterbearing shale and limestone bedrock of Ordovician age, have poor yields (Schmidt, 1982).

Limestone and dolomite interbedded with shale are the major components of bedrock in Clark County. These sedimentary rocks from the Silurian and Ordovician systems consist mostly of calcium carbonate or calcium and magnesium carbonate. The rocks of the Niagara group and of Clinton age are the most extensive of the formations that occur near the surface. The Cedarville Dolomite and Springfield Limestone (Lockport Dolomite) of the Niagara group have been the principal formations quarried at Limestone City, Durbin, and Cold Springs. In 1947, nearly 40,000 tons of limestone was quarried in the county (Schmidt, 1982). Today, only the Springfield quarry (west of Springfield) remains open. In 1990, this quarry produced about 121,142 tons of crushed stone for road construction or resurfacing (Weisgarber, 1991).

Sand and gravel resources of Clark County are part of a larger resource of glacially derived sands and gravels that were deposited within the Great Miami River drainage area. The major portion of these deposits is within the outwash terraces confined to the valleys and tributaries of the Mad River and Little Miami River. The total original sand and gravel resource of Clark County is estimated at approximately 5.7 billion tons. Analyses of samples collected from widely spaced deposits throughout the county indicate that most of the remaining undeveloped sand and gravel resources will provide good-quality materials for construction aggregate, base, and fill. The undeveloped resource of sand and gravel in Clark County appears adequate to meet the demands of the region for many years. The remaining extractable resource is mostly in rural areas, where intense land-use competition is not expected to be encountered (Strubble, 1987).

Additional information regarding natural resources is available from the Ohio Department of Natural Resources and from various local agencies.

Farming

In 1987, there were 812 farms in Clark County. More than 76 percent of the land in the county was made up of farms. The average farm size was about 239 acres. Most farms ranged from about 10 to 49 acres, but some were smaller than 10 acres and a few were more than 2,000 acres in size (U.S. Department of Commerce, 1989).

In 1987, the principal crops grown were soybeans, on 60,285 acres; corn, on 58,918 acres; wheat, on 6,863 acres; and hay, on 7,490 acres. Other small grain, pasture, and specialty crops were grown on about 10,700 acres (U.S. Department of Commerce, 1989). The area used as woodland, including pastured woodland, was about 11,600 acres in 1987. The acreage of woodland and pasture has decreased in recent years as more areas are converted to cultivated land.

The major livestock in the county in 1987 consisted of cattle and calves, hogs and pigs, and chickens (U.S. Department of Commerce, 1989).

History

Prior to European settlement, the most recent inhabitants of the survey area were Miami and Shawnee Indians. Other tribes, such as Wyandot, Delaware, Ottawa, and Mingo, also inhabited the area. The Mad River Valley, with its herb gardens and mineral springs, was a favorite hunting ground and medicinal retreat (Kinnison, 1985).

Early French and English hunters and trappers and other European explorers and soldiers told stories of the great natural wealth and beauty of the area. The endless fresh clear water of the Mad River fed by numerous springs, the rich fertile lands of the valleys of the Little Miami and Mad Rivers, and the abundant forests of the smooth, hilly countryside attracted a continuous stream of settlers to the area.

Early settlements were primitive, but after the Treaty of Greenville was signed in 1795, settlement of the area increased. The first major settlement was established at Cribb's Station, at the forks of the Mad River, in the spring of 1796 (Kinnison, 1985).

The town of Springfield was laid out in 1803, the same year that Ohio became a state. Clark County was created from parts of Champaign, Greene, and Madison Counties by an act of the Ohio Legislature on March 1, 1818. The county was named in honor of General George Rogers Clark of the Revolutionary War. Progress became more rapid after the creation of Clark County. The first census of Clark County, taken in 1820, showed a population of 610. Growth and progress stopped for a while with the failure of the Second Bank of the United States and the Panic of 1819. Springfield, the county seat, was incorporated in 1827.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of

management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures followed in making this survey are described in the National Soil Survey Handbook of the Natural Resources Conservation Service. Among the references used were the soil survey of Clark County, Ohio, published in 1958 (USDA, 1958); "Pleistocene Geology of Clark County, Ohio" (Brown, 1948); "Water Resources of Clark County, Ohio" (Norris and others); and "Ground Water Resources of Clark County, Ohio" (Schmidt, 1982).

Prior to the soil survey modernization, a soil survey review team conducted an evaluation of the 1958 Clark County soil survey at the request of the Clark County Commissioners. A report of the evaluation was prepared and sent to the Soil Inventory Board for review. After reviewing the evaluation report, the Soil Inventory Board recommended a soil survey modernization program and outlined the work to be completed.

Before the fieldwork began, a detailed study of all existing laboratory data, soil survey reports, and research studies was conducted by the Clark County soil survey staff. U.S. Geological Survey topographic maps at a scale of 1:24,000 were used to relate land and image features.

A reconnaissance was made by vehicle before the soil scientists traversed the surface on foot, examining the soils. In some areas, such as the Mad River Valley and areas of the Bellefontaine, Carlisle, Fox, Homer, Mill Creek, and Wawaka soils, the delineations in the 1958 survey were determined to be less reliable than in other areas. In the areas where the soil pattern is very complex, traverses were spaced as close as 200 yards apart. In areas of the Crosby-Kokomo-Celina general soil map unit and in other areas where the soil pattern is relatively simple, traverses were spaced about one-quarter mile apart.

As they traversed the surface, the soil scientists divided the landscape into segments based on the landform and the position of the soils on the landform. For example, a flat would be separated from a swale, or a gently sloping knoll or side slope would be separated from a flat. In most areas, soil examinations along the traverses were made at points 50 to 200 yards apart, depending on the landscape and soil patterns.

Observations of such items as landforms, vegetation, erosion, ditchbanks, and surface colors were made without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation. The soil material was examined to a depth of about 80 inches or to bedrock if the bedrock was at a depth of less than 80 inches. The soils described as typical were observed and studied in pits that were dug with shovels and spades.

At the beginning of the survey, sample areas were selected to represent the major landscapes in the county. These areas were then mapped. Extensive notes were taken on the composition of the map units in these preliminary study areas. These preliminary notes were modified as mapping progressed, and a final assessment of the composition of the individual map units was made. Some transects were made to determine the composition of soil complexes, especially the Eldean-Miamian, Celina-Strawn, and Strawn-Crosby complexes.

Samples for chemical and physical analyses were taken from representative sites of several of the soils in the survey area. The Soil Characterization Laboratory, School of Natural Resources, Ohio State University, Columbus, Ohio, made the chemical and physical analyses. The results of the analyses are

stored in a computerized data file at the laboratory. The analyses for engineering properties were made by the Ohio Department of Transportation, Division of Highways, Bureau of Testing, Soils and Foundation Section, Columbus, Ohio. The laboratory procedures can be obtained on request from the respective laboratories. The results of the studies can be obtained from the School of Natural Resources, Ohio State University; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; and the Natural Resources Conservation Service, State Office, Columbus, Ohio.

After completion of the soil mapping on aerial photographs, map unit delineations were transferred by hand to another set of the same photographs. Surface features were recorded from observation of the maps and the landscape.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Miamian-Kokomo-Celina Association

Nearly level to steep soils

Setting

Landform: Till plains
Slope range: 0 to 30 percent

Composition

Percent of survey area: 28
Extent of components in the association:
Miamian soils—55 percent
Kokomo soils—10 percent
Celina soils—10 percent
Minor soils—25 percent

Soil Properties and Qualities

Miamian

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs
Parent material: Thin layer of loess over glacial till
Surface texture: Silt loam, silty clay loam, clay loam
Slope: Nearly level to steep

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level

Celina

Depth class: Very deep
Drainage class: Moderately well drained
Position on the landform: Micro-highs, micro-lows, footslopes, backslopes
Parent material: Glacial till
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Minor Soils

- Crosby
- Eldean
- Genesee
- Milton

Use and Management

Major uses: Cropland, hay and pasture, residential areas
Management concerns: Erosion, low strength, shrink-swell, restricted permeability, slope, wetness, frost action
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

2. Miamian-Eldean-Kokomo Association

Nearly level to steep soils

Setting

Landform: Kame terraces, till plains
Slope range: 0 to 30 percent

Composition

Percent of survey area: 8
Extent of components in the association:
Miamian soils—30 percent
Eldean soils—25 percent
Kokomo soils—10 percent
Minor soils—35 percent

Soil Properties and Qualities

Miamian

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits
Parent material: Thin layer of loess over glacial till
Surface texture: Silt loam, silty clay loam, clay loam
Slope: Nearly level to steep

Eldean

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders
Parent material: Glacial outwash
Surface texture: Silty clay loam, clay loam
Slope: Nearly level to steep

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level

Minor Soils

- Drummer
- Rodman
- Thackery
- Westland

Use and Management

Major uses: Cropland, hay and pasture, woodland, residential areas
Management concerns: Droughtiness, poor filtration of effluent, erosion, slope, shrink-swell, low strength, restricted permeability
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

3. Crosby-Kokomo-Celina Association

Nearly level and gently sloping soils

Setting

Landform: Till plains
Slope range: 0 to 6 percent

Composition

Percent of survey area: 11
Extent of components in the association:
Crosby soils—45 percent
Kokomo soils—30 percent
Celina and similar soils—15 percent
Minor soils—10 percent

Soil Properties and Qualities

Crosby

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Footslopes, backslopes
Parent material: Glacial till
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level

Celina

Depth class: Very deep
Drainage class: Moderately well drained
Position on the landform: Micro-highs, micro-lows, footslopes, backslopes
Parent material: Glacial till
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Minor Soils

- Genesee

- Millsdale
- Sloan

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Erosion, restricted permeability, low strength, wetness, frost action, ponding, shrink-swell
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

4. Miamian-Milton-Millsdale Association

Nearly level to sloping soils

Setting

Landform: Till plains
Slope range: 0 to 12 percent

Composition

Percent of survey area: 2
Extent of components in the association:
Miamian and similar soils—40 percent
Milton soils—25 percent
Millsdale soils—10 percent
Minor soils—25 percent

Soil Properties and Qualities

Miamian

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits
Parent material: Thin layer of loess over glacial till
Surface texture: Silt loam, silty clay loam, clay loam
Slope: Nearly level to sloping

Milton

Depth class: Moderately deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs
Parent material: Glacial till and residuum derived from limestone or dolomite
Surface texture: Silt loam, silty clay loam
Slope: Nearly level to sloping

Millsdale

Depth class: Moderately deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till and, in some areas, the underlying residuum derived from limestone or dolomite
Surface texture: Silty clay loam
Slope: Nearly level

Minor Soils

- Donnelsville
- Eldean
- Randolph
- Ross

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Droughtiness, depth to bedrock, restricted permeability, low strength, erosion, seepage, thin layers, shrink-swell, slope
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

5. Kokomo-Strawn-Celina Association

Nearly level to sloping soils

Setting

Landform: Till plains
Slope range: 0 to 12 percent

Composition

Percent of survey area: 3
Extent of components in the association:
Kokomo soils—45 percent
Strawn and similar soils—25 percent
Celina and similar soils—20 percent
Minor soils—10 percent

Soil Properties and Qualities

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level

Strawn

Depth class: Very deep

Drainage class: Well drained
Position on the landform: Shoulders, summits, micro-highs
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level to sloping

Celina

Depth class: Very deep
Drainage class: Moderately well drained
Position on the landform: Footslopes, backslopes, micro-lows
Parent material: Glacial till
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Minor Soils

- Crosby
- Milford
- Westland

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Ponding, restricted permeability, low strength, frost action, erosion, wetness, shrink-swell
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

6. Strawn-Kokomo Association

Nearly level to steep soils

Setting

Landform: Till plains
Slope range: 0 to 30 percent

Composition

Percent of survey area: 15
Extent of components in the association:
Strawn and similar soils—45 percent
Kokomo soils—25 percent
Minor soils—30 percent

Soil Properties and Qualities

Strawn

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level to steep

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level

Minor Soils

- Celina
- Crosby
- Eldean

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Erosion, low strength, restricted permeability, shrink-swell, frost action, wetness, ponding
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

7. Kokomo-Strawn-Crosby Association

Nearly level to sloping soils

Setting

Landform: Till plains
Slope range: 0 to 12 percent

Composition

Percent of survey area: 5
Extent of components in the association (fig. 2):
Kokomo soils—45 percent
Strawn and similar soils—30 percent
Crosby soils—15 percent
Minor soils—10 percent

Soil Properties and Qualities

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam

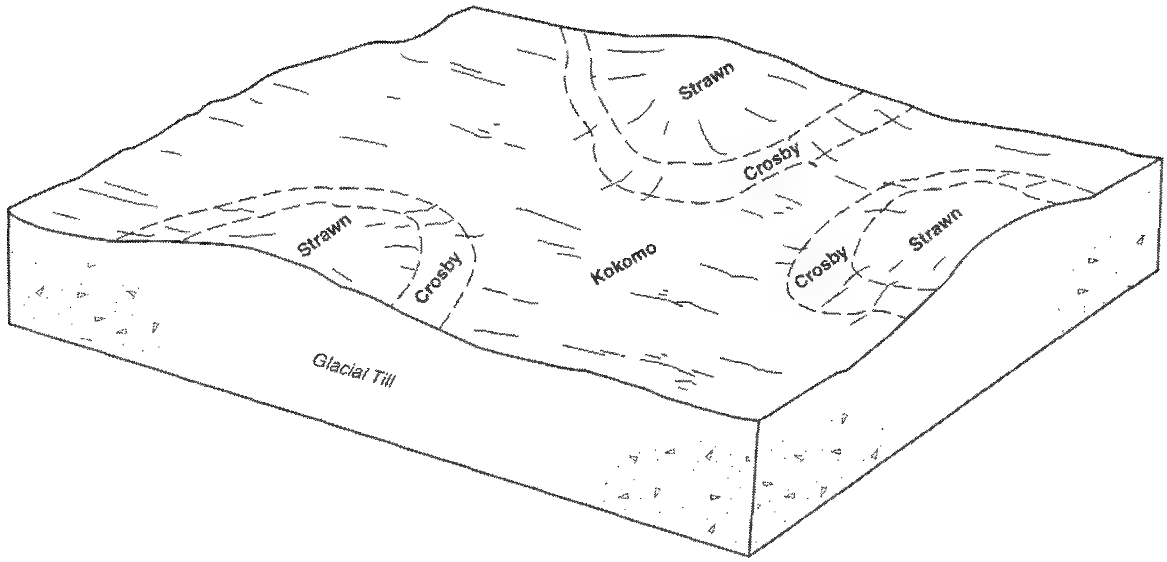

Figure 2.—Typical pattern of soils in the Kokomo-Strawn-Crosby association.

Slope: Nearly level

Strawn

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Shoulders, summits
Parent material: Glacial till
Surface texture: Silt loam, silty clay loam
Slope: Nearly level and gently sloping

Crosby

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Footslopes, backslopes, micro-lows
Parent material: Glacial till
Surface texture: Silt loam
Slope: Nearly level to sloping

Minor Soils

- Celina
- Milford

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Ponding, restricted permeability, low strength, frost action, erosion, shrink-swell, wetness
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

8. Eldean-Lippincott Association

Nearly level to sloping soils

Setting

Landform: Outwash plains, valley trains
Slope range: 0 to 12 percent

Composition

Percent of survey area: 13
Extent of components in the association (fig. 3):
Eldean soils—40 percent
Lippincott soils—25 percent
Minor soils—35 percent

Soil Properties and Qualities

Eldean

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, risers, treads
Parent material: Glacial outwash
Surface texture: Silt loam, silty clay loam

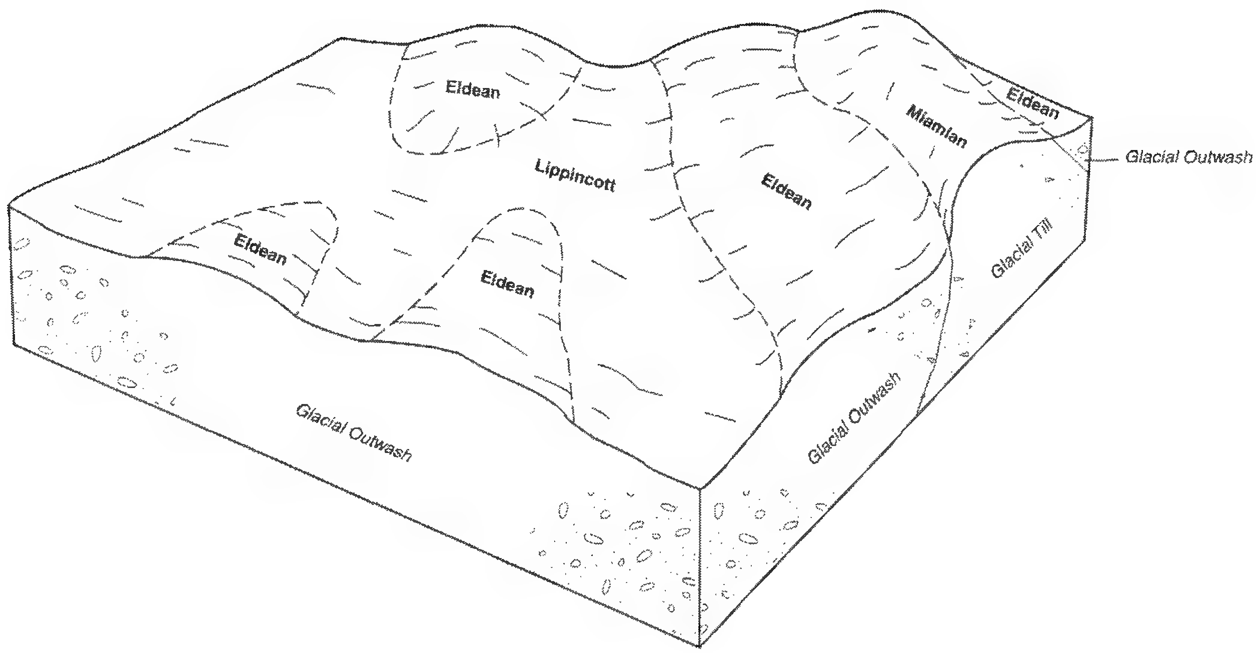

Figure 3.—Typical pattern of soils in the Eldean-Lippincott association.

Slope: Nearly level to sloping

Lippincott

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial outwash
Surface texture: Silty clay loam
Slope: Nearly level

Minor Soils

- Miamian
- Savona
- Sloan
- Tremont
- Warsaw
- Westland

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Droughtiness, poor filtration, erosion, slope, shrink-swell, low strength
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

9. Drummer-Ockley-Eldean Association

Nearly level and gently sloping soils

Setting

Landform: Outwash plains
Slope range: 0 to 6 percent

Composition

Percent of survey area: 2
Extent of components in the association:
Drummer soils—45 percent
Ockley soils—15 percent
Eldean soils—10 percent
Minor soils—30 percent

Soil Properties and Qualities

Drummer

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial outwash
Surface texture: Silty clay loam
Slope: Nearly level

Ockley

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads
Parent material: Glacial outwash
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Eldean

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads, risers
Parent material: Glacial outwash
Surface texture: Silt loam, silty clay loam, gravelly clay loam
Slope: Nearly level and gently sloping

Minor Soils

- Miamian
- Waupecan
- Waynetown

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Ponding, low strength, frost action, restricted permeability, erosion, slope
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

10. Tremont-Ross-Sloan Association

Nearly level soils

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Composition

Percent of survey area: 3
Extent of components in the association:
Tremont soils—35 percent
Ross soils—20 percent
Sloan soils—15 percent
Minor soils—30 percent

Soil Properties and Qualities

Tremont

Depth class: Very deep
Drainage class: Moderately well drained
Position on the landform: Steps on flood plains
Parent material: Alluvium
Surface texture: Silt loam
Slope: Nearly level

Ross

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Steps on flood plains
Parent material: Alluvium
Surface texture: Silt loam, silty clay loam
Slope: Nearly level

Sloan

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Steps on flood plains
Parent material: Alluvium
Surface texture: Silt loam
Slope: Nearly level

Minor Soils

- Eldean
- Lippincott
- Savona

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Flooding, low strength, frost action, wetness, restricted permeability
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

11. Eldean-Ockley-Westland Association

Nearly level to sloping soils

Setting

Landform: Outwash plains and terraces
Slope range: 0 to 12 percent

Composition

Percent of survey area: 9
Extent of components in the association:
Eldean soils—25 percent

Ockley and similar soils—25 percent
Westland soils—15 percent
Minor soils—35 percent

Soil Properties and Qualities

Eldean

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads, risers
Parent material: Glacial outwash
Surface texture: Silt loam, gravelly clay loam
Slope: Nearly level to sloping

Ockley

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads, risers
Parent material: Glacial outwash
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Westland

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial outwash
Surface texture: Silty clay loam
Slope: Nearly level

Minor Soils

- Lippincott
- Sloan
- Waynetown

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Low strength, erosion, slope, droughtiness, poor filtration, shrink-swell, ponding
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

12. Westland-Milford-Ockley Association

Nearly level and gently sloping soils

Setting

Landform: Outwash plains and lacustrine areas
Slope range: 0 to 6 percent

Composition

Percent of survey area: 1
Extent of components in the association:
Westland soils—30 percent
Milford soils—20 percent
Ockley soils—15 percent
Minor soils—35 percent

Soil Properties and Qualities

Westland

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial outwash
Surface texture: Silty clay loam
Slope: Nearly level

Milford

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Lacustrine sediments
Surface texture: Silty clay loam
Slope: Nearly level

Ockley

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads
Parent material: Glacial outwash
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Minor Soils

- Eldean
- Miamian
- Millsdale
- Sloan

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Ponding, low strength, restricted permeability, frost action, erosion, slope
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

Formation of the Soils

In this section the major factors of soil formation are described and related to the soils in Clark County. Also, some of the processes of soil formation are described.

Factors of Soil Formation

Soil is a three-dimensional natural body capable of supporting plant growth. The nature of the soil at a specific site is the result of the interaction of many factors and processes. The major factors of soil formation are parent material, climate, living organisms, relief, and time.

Parent Material

The material in which a soil formed is called parent material. Most of the parent material in Clark County was deposited by the last glacier that covered the area thousands of years ago or by meltwater from this glacier. Some other parent materials are older dolomitic limestone bedrock, more recent alluvium deposited by modern streams, and organic deposits from decaying plants.

Glacial till was deposited directly beneath glacial ice and was not significantly acted upon by water. The till contains a variety of particles ranging from clay to large stones. Most pebbles are angular; this shape indicates little water action. Although most of the material in the till is of local origin, some igneous stones were carried from parts of Canada. The glacial till at the surface was deposited during the Wisconsinan glaciation. Celina, Crosby, Kokomo, Strawn, and Miamian soils are examples of soils that formed in glacial till. Meltwater deposits were laid down by water from the melting glacier. Sand and gravel were deposited in rapidly moving, sloping streams and over broad plains. Eldean, Lippincott, Ockley, Rush, and Warsaw soils formed in sandy and gravelly deposits on stream terraces or outwash plains. Where streams became more level, fine sand and silt particles were deposited as lacustrine sediments in local lake basins. Patton soils formed in these fine sand and silt sediments.

Dolomitic limestone is the parent material of the Donnelsville, Millsdale, Milton, and Randolph soils. It has a very high calcium carbonate equivalent. It is not violently effervescent, however, because of the dolomitic nature of the limestone.

Alluvium is the parent material of the soils on flood plains. Alluvial material accumulates when fresh sediments are added by stream overflow. The deposits vary widely, depending on the gradient of the stream and the source of the sediment. Alluvial sediment is stratified because deposition occurs in three basic stages. Gravel and stones are deposited on the streambed; sand is deposited as bars along meander inner banks; and sand, silt, and clay are deposited during flooding. Genesee, Ross, Sloan, and Tremont soils formed in alluvium. Carlisle soils and the upper part of Adrian and Linwood soils formed in decayed plant material that accumulated in marshes and fens. The permanent wetness slowed decomposition, and the organic matter accumulated.

Climate

The climate in Clark County is uniform enough that it has not greatly contributed to differences among the soils. It has favored physical change and chemical weathering of the parent material and the activity of living organisms.

The amount of precipitation varies as a result of micro-climate. In general, however, runoff on steep slopes reduces the amount of effective precipitation and drainage in depressions increases it. Rainfall has been adequate to leach from the upper part of the subsoil any carbonates that were in the parent material of some of the soils on uplands and terraces.

Wetting and drying cycles have resulted in the translocation of clay minerals and the formation of soil structure.

The range in temperature has favored both physical change and chemical weathering of the parent material. Freezing and thawing aided the formation of soil structure. Warm temperatures in summer favored chemical reactions in the weathering of the primary minerals. Rainfall and temperatures have been conducive to plant growth and the accumulation of organic matter in all of the soils.

Living Organisms

The vegetation under which a soil forms influences the color, structure, and content of organic matter. The surface layer of soils that formed under trees is generally lighter in color than that of soils that formed under grass. Grasses generally return more organic matter to the soil than trees do. Grasses also provide shelter for many burrowing animals that alter the structure and thickness of soil horizons. Earthworms, burrowing insects, and small animals are constantly mixing the soil, making it more porous to air and water and adding organic residue. Bacteria, fungi, and other micro-organisms contribute to the breakdown of organic residue. Generally, fungi are more active in acid soils and bacteria in alkaline soils.

About six native plant communities are recognized as the natural vegetation of Clark County at the time of the earliest land surveys (Gordon, 1966). The dominant forest type was the mixed oak forest. This forest type consisted primarily of white oak, black oak, chestnut oak, and some hickory. This plant community is associated with the better drained, more sloping areas of Eldean, Miamian, and Strawn soils.

Beech forests occupied the glacial till plain in the northwestern part of Clark County. These forests consisted mainly of beech, sugar maple, red oak, white ash, and white oak. Celina, Crosby, Kokomo, and Miamian soils are associated with areas that were beech forests.

Small areas of prairie grasslands were scattered mainly across the eastern two-thirds of Clark County. Most of these grass-dominated communities were associated with the wetter soils, such as Drummer, Kokomo, Lippincott, and Westland soils. The drier prairies and borders were dominated by big bluestem, little bluestem, switchgrass, and indiangrass. These areas are associated with the nearly level areas of Eldean, Ockley, and Rush soils.

Oak-sugar maple forests consisted dominantly of oaks and maples, walnut, ash, elm, basswood, and hickory. These forests are associated with Eldean, Lippincott, and Westland soils in the western part of the county.

A minor area of elm-ash swamp forest in the extreme southwestern part of the county consisted of various elms, ash, and maples and included sycamore and cottonwood in the wettest areas. This area is associated with the Eldean, Lippincott, Ross, and Tremont soils.

The marsh and fen plant communities are associated with the very poorly drained Adrian, Carlisle, and Linwood soils. These communities consisted of a wide variety of water-tolerant species, including bulrushes, giant reedgrass, wild rice, cattail, bur-reed, wapato, pickerelweed, and rose mallow.

Human activities also affect soil formation. Examples of these activities are cultivation, seeding, artificial drainage, irrigation, and cutting and filling. Accelerated erosion caused by clearing and cultivating the sloping soils, such as some areas of Eldean and Miamian soils, illustrates the impact of humans on soil formation. The loss of the surface soil and the compaction of the subsoil affect runoff and plant growth. Ditches and subsurface drains have been used in large areas of the Drummer and Westland soils. Artificial drainage reduces the content of organic matter and affects the processes of soil formation. Adding lime or fertilizer also affects the long-term development of the soil.

Relief

Relief, along with parent material, affects the natural drainage of soils. It influences the amount of runoff and the depth to a seasonal high water table. Generally, steeper soils have better drainage than nearly level soils. If the extent of natural drainage differs, different soils can form in the same parent material. For example, both Drummer and Rush soils formed in glacial outwash deposits. Rush soils are in the higher positions, and the water table generally is more than 6 feet below the surface. Rush soils are well drained. Drummer soils, however, are in low, nearly level areas, and the water table is near or above the surface. These soils are very poorly drained.

A drainage sequence, or soil catena, is a group of soils that formed in the same parent material but differ in the extent of natural drainage. For example, the well drained Miamian soils, the moderately well drained Celina soils, the somewhat poorly drained Crosby soils, and the very poorly drained Kokomo soils make up a drainage sequence. All of these soils formed in silt loam, loam, or clay loam glacial till.

Time

The length of time the parent material has been exposed to the soil-forming processes affects the nature of the soil that forms. The youngest soils in Clark County are those that formed in recent stream deposits. Genesee, Ross, Sloan, and Tremont soils are examples. Younger soils have less well defined horizons than the older soils.

The glacial deposits in Clark County are of Wisconsinan age and are geologically young. Nevertheless, sufficient time has elapsed for the active forces of climate, plants, and animals to produce

distinct horizons. In most of the soils, carbonates have been leached, structure has developed in the subsoil, and organic matter has accumulated in the surface layer.

Processes of Soil Formation

Soil forms through complex, continuing processes. These processes include addition, removal, transfer, and alteration.

The accumulation of organic matter in the formation of mineral soils is the addition process. The addition of organic residue has produced a dark surface layer. Drummer, Kokomo, Lippincott, and Patton soils are examples of soils in which this process has taken place. The upper part of the profile in these soils originally was not darker than the lower part.

The loss of lime from the upper 2 or 3 feet of many of the soils in Clark County is an example of the removal process. Although the parent material was limy, water percolating through the soil has leached the lime from the upper part of the soil. Celina and Crosby soils have had carbonates leached from the upper part of the profile.

Water is the carrier for most of the transfers that have occurred in the soils in Clark County. Clay has been transferred from the A horizon to the B horizon in many of the soils. The A horizon has become a zone of eluviation and the B horizon a zone of illuviation. Thin clay films are in pores and on the faces of peds in the B horizon of some soils. The clay has been transferred from the A horizon. The presence of clay films is an important criterion in soil classification.

The reduction and solution of ferrous iron are examples of the alteration process. This process has taken place in the very poorly drained soils. Reduction of iron, or gleying, is evident in Drummer, Patton, and Sloan soils. It is the result of a recurring water table. Gray soil colors indicate gleying. Reduced iron is soluble, but the iron in the soils in Clark County commonly has remained in the horizon where it originated or has settled in an underlying horizon. Iron can be reoxidized and segregated in places to form yellowish brown mottles that are brighter than the surrounding soil. The alteration of iron causes mottling in soils that are not well drained.

To a varying degree, each of the four soil-forming processes has affected all of the soils in Clark County. The accumulation of organic matter has been prominent in the formation of Adrian and Carlisle soils. The removal of carbonates and the transfer of clay have been prominent in the formation of other soils.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 4 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualf (*Aqu*, meaning water, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ochraqualfs (*Ochr*, indicating a light colored surface layer, plus *aqualf*, the suborder of the Alfisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Aeric Ochraqualfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Aeric Ochraqualfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1999). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Adrian Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow to moderately rapid in the organic material and rapid in the substratum
Parent material: Organic material over gravelly, loamy, and sandy outwash

Landforms: Outwash plains and till plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Adjacent soils: Carlisle, Eldean, Lippincott
Taxonomic classification: Sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists

Typical Pedon

Adrian muck, drained, about 2.5 miles south of New Carlisle, in Bethel Township; about 660 feet north and 2,245 feet west of the center of sec. 26, T. 3, R. 9:

Oa1—0 to 10 inches; muck (sapric material), black (N 2/0) broken face and rubbed; about 5 percent fibers, less than 5 percent rubbed; moderate medium granular structure; very friable; primarily herbaceous fibers; neutral; abrupt wavy boundary.

Oa2—10 to 22 inches; muck (sapric material), very dark gray (10YR 3/1) broken face and rubbed; about 10 percent fibers, about 5 percent rubbed; weak coarse subangular blocky structure; very friable; primarily herbaceous fibers; slightly acid; gradual wavy boundary.

2C1—22 to 28 inches; brown (10YR 5/3) very gravelly sandy loam; single grain; loose; few gray (10YR 5/1) gravelly silt loam bodies; about 55 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

2C2—28 to 80 inches; brown (10YR 5/3) very gravelly loamy sand; single grain; loose; about 55 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the organic material: 16 to 50 inches
Content of rock fragments: 2C horizon—30 to 60 percent

Surface tier:
Color—hue of 10YR or neutral, value of 2, chroma of 0 to 3
Texture—muck (sapric material)

Subsurface tier:
Color—hue of 10YR, 7.5YR, or neutral, value of 2 or 3, chroma of 0 to 3
Texture—sapric material

2C horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 3
Texture—the gravelly or very gravelly analogs of sandy loam and loamy sand

Carlisle Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow to moderately rapid
Parent material: Organic materials more than 51 inches thick
Landforms: Outwash plains and till plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Adjacent soils: Eldean, Lippincott
Taxonomic classification: Euic, mesic Typic Medisaprists

Typical Pedon

Carlisle muck, undrained, about 3.5 miles south of New Carlisle, in Bethel Township; about 740 feet east and 265 feet north of the center of sec. 25, T. 3, R. 9:

Oa1—0 to 10 inches; sapric material, black (10YR 2/1) broken face and rubbed; about 10 percent fibers, less than 5 percent rubbed; weak fine granular structure; friable; common weakly decomposed wood fragments; neutral; abrupt smooth boundary.

Oa2—10 to 20 inches; sapric material, dark brown (7.5YR 3/2) broken face, very dark brown (10YR 2/2) rubbed; about 15 percent fibers, less than 10 percent rubbed; weak fine granular structure; friable; common weakly decomposed wood fragments; neutral; abrupt smooth boundary.

Oa3—20 to 35 inches; sapric material, black (10YR 2/1) broken face and rubbed; about 15 percent fibers, about 10 percent rubbed; weak coarse granular structure; friable; neutral; clear wavy boundary.

Oa4—35 to 50 inches; sapric material, dark reddish brown (5YR 3/3) broken face, dark reddish brown (5YR 2.5/2) rubbed; about 30 percent fiber, about 12 percent rubbed; massive; friable; neutral; clear wavy boundary.

Oa5—50 to 80 inches; sapric material, dark brown (10YR 3/3) broken face, dark reddish brown (5YR 2/2) rubbed; about 50 percent fiber, about 15 percent rubbed; massive; friable; neutral.

Range in Characteristics

Thickness of the organic material: 51 to 80 inches

Surface tier:
Color—hue of 10YR, value of 2, chroma of 1
Texture—muck (sapric material)

Subsurface tier:
Color—hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, chroma of 1 to 3
Texture—sapric material

Bottom tier:
Color—hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, chroma of 2 or 3

Casco Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderate in the solum and rapid in the substratum
Parent material: Sandy and gravelly glacial outwash deposits
Landforms: Outwash plains and outwash terraces
Position on the landform: Knolls, backslopes, shoulders
Slope range: 6 to 20 percent
Adjacent soils: Eldean, Miamian, Rodman
Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs

Typical Pedon

Casco gravelly loam, 12 to 20 percent slopes, eroded, about 1.8 miles north of New Moorefield, in Moorefield Township; about 660 feet south and 1,030 feet west of the northeast corner of sec. 11, T. 5, R. 10:

Ap—0 to 7 inches; dark brown (7.5YR 4/2) gravelly loam, brown (7.5YR 4/4) dry; about 35 percent brown (10YR 4/4) clay loam mixed from the subsoil; moderate medium and fine granular structure; friable; many medium and fine roots; about 15 percent gravel; neutral; abrupt wavy boundary.
Bt1—7 to 13 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; common medium and fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; about 10 percent gravel; neutral; clear wavy boundary.
Bt2—13 to 17 inches; brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; common medium and fine roots; few distinct dark brown (7.5YR 4/2) clay films on faces of peds; about 30 percent gravel; slightly alkaline; clear wavy boundary.
2C1—17 to 22 inches; yellowish brown (10YR 5/4) gravelly loamy coarse sand; single grain; loose; few medium and fine roots; about 20 percent gravel; strongly effervescent; moderately alkaline; clear wavy boundary.
2C2—22 to 80 inches; brown (10YR 5/3) gravelly coarse sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 10 to 24 inches
Depth to carbonates: 10 to 20 inches
Content of coarse fragments: Ap horizon—5 to 35 percent; Bt horizon—5 to 30 percent; C horizon—5 to 55 percent

Ap horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 2 or 3
Texture—loam, silt loam, gravelly loam

Bt horizon:
Color—hue of 10YR, 7.5YR, or 5YR, value of 3 to 5, chroma of 3 or 4
Texture—clay loam, loam, or the gravelly analogs of these textures

2C horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 3 or 4
Texture—loamy coarse sand, coarse sand, sand, or the gravelly and very gravelly analogs of these textures

Celina Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Parent material: Glacial till
Landform: Till plains
Position on the landform: Low knolls, backslopes, footslopes, micro-highs, micro-lows
Slope range: 0 to 6 percent
Adjacent soils: Crosby, Kokomo, Miamian, Strawn
Taxonomic classification: Fine, mixed, mesic Aquic Hapludalfs

Typical Pedon

Celina silt loam, 2 to 6 percent slopes, about 3.5 miles northeast of South Vienna, in Pleasant Township; about 1,980 feet northeast of the intersection of Callahan Road and North Houston Pike along Houston Pike, then 580 feet east:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common fine roots; few rock fragments; strongly acid; abrupt smooth boundary.
BE—8 to 16 inches; brown (10YR 5/3) silty clay loam; moderate medium subangular blocky structure;

firm; common fine roots; many faint grayish brown (10YR 5/2) silt coatings on faces of peds; common distinct black (10YR 2/1) stains (iron and manganese oxides); few rock fragments; slightly acid; clear wavy boundary.

Bt—16 to 27 inches; dark yellowish brown (10YR 4/4) clay; few fine distinct yellowish brown (10YR 5/6) and few fine distinct dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine black (10YR 2/1) concretions (iron and manganese oxides); about 5 percent rock fragments; neutral; clear wavy boundary.

BC—27 to 32 inches; yellowish brown (10YR 5/4) clay loam; weak medium subangular blocky structure; firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C—32 to 80 inches; yellowish brown (10YR 5/4) loam; massive; firm; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to carbonates: 18 to 40 inches
Thickness of the loess mantle: 8 to 16 inches
Content of rock fragments: Bt horizon—2 to 10 percent; C horizon—5 to 15 percent

Ap horizon:
Color—hue of 10YR, value of 4, chroma of 2 or 3
Texture—silt loam

BE horizon:
Color—hue of 10YR, value of 5, chroma of 3 to 6
Texture—silt loam, silty clay loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—clay loam, silty clay loam, clay

C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—loam

Crosby Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow and very slow
Parent material: Glacial till
Landform: Till plains
Position on the landform: Footslopes, backslopes, micro-highs, micro-lows
Slope range: 0 to 6 percent
Adjacent soils: Celina, Kokomo, Miamian, Strawn
Taxonomic classification: Fine, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Crosby silt loam, 0 to 2 percent slopes, about 3 miles west of North Hampton, in Pike Township; about 2,060 feet north and 1,190 feet west of the center of sec. 21, T. 3, R. 10:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; moderate fine granular structure; friable; common fine roots; few rock fragments; strongly acid; abrupt smooth boundary.

Bt1—9 to 14 inches; dark yellowish brown (10YR 4/4) clay; common distinct dark grayish brown (10YR 4/2) and common distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few rock fragments; strongly acid; clear wavy boundary.

Bt2—14 to 20 inches; dark yellowish brown (10YR 4/4) clay; many distinct dark grayish brown (10YR 4/2) and common distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; about 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt3—20 to 25 inches; dark yellowish brown (10YR 4/4) clay; many distinct dark grayish brown (10YR 4/2) and common distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; about 10 percent rock fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

C—25 to 80 inches; yellowish brown (10YR 5/4) loam; common distinct yellowish brown (10YR 5/6) mottles; massive; firm; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to carbonates: 20 to 40 inches
Thickness of the loess mantle: 0 to 18 inches
Content of rock fragments: Bt horizon—0 to 10 percent; C horizon—5 to 12 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2
Texture—silt loam

Bt horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 1 to 6
Texture—clay loam, silty clay loam, clay

BC and C horizons:
Color—hue of 10YR, value of 4 to 6, chroma of 3 or 4
Texture—loam

Donnelsville Series

Depth class: Deep or very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Colluvium and residuum derived from limestone or dolomite
Landform: Till plains
Position on the landform: Footslopes, backslopes
Slope range: 18 to 70 percent
Adjacent soils: Eldean, Miamian, Milton
Taxonomic classification: Loamy-skeletal, carbonatic, mesic Eutrochreptic Rendolls

Typical Pedon

Donnelsville very channery loam, in an area of Donnelsville-Rock outcrop complex, 30 to 70 percent slopes, about 1.9 miles southwest of Enon, in Mad River Township; about 130 feet east and 845 feet south of the northwest corner of sec. 5, T. 3, R. 8:

A—0 to 14 inches; very dark gray (10YR 3/1) very channery loam, very dark gray (10YR 3/1) dry; weak fine and very fine granular structure; friable; common medium and fine roots; about 55 percent rock fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bw1—14 to 23 inches; brown (10YR 4/3) extremely channery loam; weak fine and very fine granular structure; friable; common medium and fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; about 60 percent rock fragments; strongly effervescent; moderately alkaline; clear irregular boundary.

Bw2—23 to 30 inches; yellowish brown (10YR 5/4) extremely channery loam; weak fine and very fine granular structure; friable; common medium and fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings in root channels; about 80 percent rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

C—30 to 55 inches; light yellowish brown (10YR 6/4) extremely channery loam; common distinct yellowish brown (10YR 5/4) mottles; massive; friable; few fine roots; about 85 percent rock fragments; strongly effervescent; strongly alkaline; clear smooth boundary.

2R—55 to 58 inches; dolomite.

Range in Characteristics

Thickness of the solum: 24 to 48 inches
Thickness of the mollic epipedon: 10 to 19 inches
Depth to bedrock: 40 to 80 inches
Content of rock fragments: A horizon—15 to 60 percent; Bw horizon—35 to 85 percent; C horizon—60 to 90 percent

A horizon:
Color—hue of 10YR or 7.5YR, value of 2 or 3, chroma of 1 to 3
Texture—the channery or very channery analogs of loam or silt loam

Bw horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 2 to 4
Texture—the very channery and extremely channery analogs of loam, silt loam, silty clay loam, or clay loam

C horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 3 or 4
Texture—the very channery and extremely channery analogs of loam or silt loam

Drummer Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate in the subsoil and very rapid in the substratum
Parent material: Silty material and loamy outwash underlain by gravelly outwash
Landforms: Outwash plains and outwash terraces
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Miamian, Waynetown, Westland
Taxonomic classification: Fine-silty, mixed, mesic Typic Haplaquolls

Typical Pedon

Drummer silty clay loam, gravelly substratum, about 4.5 miles northwest of South Charleston, in Harmony Township; about 1,770 feet south and 1,770 feet east of the northwest corner of sec. 31, T. 6, R. 9:

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine and fine granular structure; firm; few fine and medium roots; few pebbles; neutral; clear smooth boundary.

A—9 to 15 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine and fine subangular blocky structure; firm; few very fine and fine roots; few pebbles; neutral; clear wavy boundary.

Bg—15 to 22 inches; dark gray (N 4/0) silty clay loam; common medium distinct olive brown (2.5Y 4/4) and few fine distinct light olive brown (2.5Y 5/4) mottles; moderate fine and medium angular blocky structure; firm; few very fine roots; very dark gray (10YR 3/1) organic coatings; few fine dark gray (10YR 4/1) coatings on faces of peds, in pores, and in root channels; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; slightly alkaline; clear wavy boundary.

Btg—22 to 31 inches; gray (N 5/0) silty clay loam; many medium distinct light olive brown (2.5Y 5/4) mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; firm; few very fine roots; many gray (N 5/0) coatings on faces of peds; few fine dark grayish brown (10YR 4/2) clay films on faces of peds, in pores, and in root channels; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; slightly alkaline; gradual wavy boundary.

B′g—31 to 42 inches; gray (N 5/0) silty clay loam; many medium prominent olive yellow (2.5Y 6/6) and common medium distinct light olive brown (2.5Y 5/4) mottles; weak coarse prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; few fine grayish brown (10YR 5/2) coatings on faces of peds, in pores, and in root channels; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; slightly alkaline; clear wavy boundary.

2Bg—42 to 47 inches; grayish brown (2.5Y 5/2) silt loam; common medium prominent olive yellow (2.5Y 6/6) and common medium distinct gray (N 5/0) mottles; weak coarse subangular blocky structure; friable; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); about 10 percent soft weathered limestone ghosts; about 12 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

3Cg1—47 to 60 inches; dark gray (N 4/0) gravelly loamy sand; single grain; loose; about 25 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

3Cg2—60 to 80 inches; dark gray (N 4/0) very gravelly sand; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 42 to 60 inches
Thickness of the mollic epipedon: 10 to 21 inches
Depth to carbonates: 40 to 65 inches
Thickness of the loess mantle: 40 to 60 inches
Content of rock fragments: 2Bg horizon—5 to 15 percent; 3Cg horizon—15 to 60 percent

A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam

Bg and Btg horizons:
Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2
Texture—silty clay loam

2Bg horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2
Texture—silt loam, loam

3Cg horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2
Texture—the gravelly or very gravelly analogs of loamy sand or sand

Eldean Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate or moderately slow in the subsoil and rapid in the substratum
Parent material: Glacial outwash
Landforms: Outwash plains, outwash terraces, kame moraines
Position on the landform: Backslopes, shoulders, summits, micro-highs, risers, treads
Slope range: 0 to 30 percent
Adjacent soils: Lippincott, Miamian, Ockley, Rush
Taxonomic classification: Fine, mixed, mesic Typic Hapludalfs

Typical Pedon

Eldean silt loam, 0 to 2 percent slopes, about 3.5 miles south of New Carlisle, in Bethel Township; about 2,245 feet south of the center of sec. 31, T. 3, R. 9:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—10 to 17 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; common faint yellowish brown (7.5YR 4/4) clay films on faces of peds; about 5 percent gravel; neutral; clear wavy boundary.

Bt2—17 to 24 inches; brown (7.5YR 4/4) clay; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds; about 10 percent gravel; neutral; clear wavy boundary.

Bt3—24 to 31 inches; brown (7.5YR 4/4) gravelly clay; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds; common distinct carbonate coatings on rock fragments; about 20 percent limestone gravel; neutral; clear wavy boundary.

2BC—31 to 38 inches; brown (7.5YR 4/4) very gravelly loam; weak medium subangular blocky structure; firm; common fine roots; about 55 percent limestone gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

2C—38 to 80 inches; dark yellowish brown (10YR 4/4) extremely gravelly loamy sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to carbonates: 18 to 36 inches
Content of rock fragments: Ap horizon and upper part of Bt horizon—0 to 30 percent; lower part of Bt horizon and BC horizon—10 to 60 percent; C horizon—5 to 70 percent

Ap horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 2 to 4
Texture—silt loam, clay loam

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, chroma of 3 to 6
Texture—clay, clay loam, loam, or the gravelly analogs of these textures

2BC horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 6, chroma of 2 to 4
Texture—sandy loam, loam, clay loam, sandy clay loam, or the gravelly or very gravelly analogs of these textures

2C horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 to 4
Texture—stratified gravelly coarse sandy loam to extremely gravelly coarse sand or loamy sand with strata of sand or loamy sand in some pedons

Genesee Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Steps
Slope range: 0 to 2 percent
Adjacent soils: Miamian, Sloan
Taxonomic classification: Fine-loamy, mixed, mesic Fluventic Eutrochrepts

Typical Pedon

Genesee silt loam, till substratum, rarely flooded, about 2.5 miles west of Tremont City, in German Township; about 2,200 feet north and 260 feet west of the southeast corner of sec. 29, T. 4, R. 10:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; friable; few very fine roots; few pebbles; neutral; abrupt smooth boundary.

Bw1—10 to 18 inches; brown (10YR 4/3) silt loam; weak medium and fine subangular blocky structure; friable; few very fine roots; common distinct dark brown (10YR 3/3) organic coatings on faces of peds; few pebbles; neutral; clear wavy boundary.

Bw2—18 to 25 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; few very fine roots; few pebbles; neutral; clear wavy boundary.

Bw3—25 to 36 inches; brown (10YR 4/3) loam; few medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few very fine roots; few pebbles; slightly effervescent; slightly alkaline; clear wavy boundary.

Bw4—36 to 48 inches; brown (10YR 4/3) loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; few pebbles; slightly

effervescent; slightly alkaline; clear wavy boundary.

C1—48 to 56 inches; dark yellowish brown (10YR 4/4) gravelly loam; common medium distinct yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) mottles; massive; friable; about 20 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

C2—56 to 70 inches; yellowish brown (10YR 5/4) gravelly loamy sand; massive; loose; about 20 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

2C3—70 to 80 inches; dark gray (10YR 4/1) silt loam; massive; very firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Content of rock fragments: C horizon—10 to 30 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam, loam

C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 4
Texture—silt loam, loam, sandy loam, gravelly sandy loam, gravelly loam, gravelly loamy sand

2C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—silt loam, loam

Kokomo Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow
Parent material: Glacial till
Landform: Till plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Celina, Crosby, Miamian
Taxonomic classification: Fine, mixed, mesic Typic Argiaquolls

Typical Pedon

Kokomo silty clay loam, about 4 miles south of Springfield, in Greene Township; about 265 feet south and 265 feet west of the northeast corner of sec. 6, T. 4, R. 8:

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; firm; common fine roots; few pebbles; slightly acid; abrupt smooth boundary.

A—11 to 19 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; common fine roots; few pebbles; slightly acid; clear wavy boundary.

Btg1—19 to 27 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and common medium distinct grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint grayish brown (2.5Y 5/2) clay films on faces of peds; few pebbles; slightly acid; clear wavy boundary.

Btg2—27 to 38 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/4 and 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint grayish brown (2.5Y 5/2) clay films on faces of peds; common distinct black (10YR 2/1) coatings on faces of peds (iron and manganese oxides); few pebbles; neutral; clear wavy boundary.

Btg3—38 to 52 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; common faint light brownish gray (10YR 6/2) clay films on faces of peds; common distinct black (10YR 2/1) coatings on faces of peds (iron and manganese oxides); few rock fragments; slightly alkaline; clear wavy boundary.

C1—52 to 60 inches; yellowish brown (10YR 5/4) loam; common fine faint yellowish brown (10YR 5/6) and many medium distinct gray (10YR 5/1) mottles; massive; firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—60 to 80 inches; yellowish brown (10YR 5/4) loam; massive; firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 36 to 60 inches

Thickness of the mollic epipedon: 10 to 24 inches
Content of rock fragments: Btg horizon—0 to 5 percent; C horizon—5 to 10 percent

A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam

Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—silty clay loam or clay loam

C horizon:
Color—hue of 10YR or 2.5Y, value of 5, chroma of 2 to 4
Texture—loam, clay loam

Linwood Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow to moderately rapid in the organic material and moderate or moderately slow in the substratum
Parent material: Organic material over silty, loamy, and gravelly deposits
Landforms: Outwash plains and till plains
Position on the landform: Closed depressions
Slope range: 0 to 2 percent
Adjacent soils: Lippincott, Patton, Westland
Taxonomic classification: Loamy, mixed, euic, mesic Terric Medisaprists

Typical Pedon

Linwood muck, undrained, about 5.5 miles north of Springfield, in Greene Township; about 1,030 feet south and 2,245 feet west of the northeast corner of sec. 27, T. 5, R. 8:

Oa1—0 to 14 inches; muck (sapric material), black (N 2/0) broken face and rubbed; moderate fine granular structure; very friable; many medium and fine roots; about 5 percent fiber, 2 percent rubbed; neutral; clear wavy boundary.
Oa2—14 to 23 inches; sapric material, black (N 2/0) broken face and rubbed; very dark gray (N 3/0) dry; weak coarse and medium subangular blocky structure; friable; common medium and fine roots; few fine shells; about 10 percent fiber, about 5 percent rubbed; neutral; clear wavy boundary.
Oa3—23 to 36 inches; sapric material, black (10YR 2/1) broken face and rubbed (sedimentary peat); very dark gray (10YR 3/1) dry; weak thick platy structure; friable; few fine roots; about 40 percent fiber, about 10 percent rubbed; neutral; clear wavy boundary.
2Cg1—36 to 40 inches; gray (N 5/0) silt loam; massive; friable; few fine shells; few plant fibers; strongly effervescent; moderately alkaline; gradual wavy boundary.
2Cg2—40 to 48 inches; dark gray (N 4/0) silt loam; massive; friable; few fine shells; few plant fibers; strongly effervescent; moderately alkaline; gradual wavy boundary.
2Cg3—48 to 80 inches; dark gray (N 4/0)) silt loam; massive; friable; coatings in vertical partings; few pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the organic material: 16 to 51 inches
Depth to carbonates: 20 to 60 inches
Content of rock fragments: 2Cg horizon—0 to 15 percent

Surface tier:
Color—hue of 2.5Y, 10YR, or neutral, value of 2, chroma of 0 to 2
Texture—muck, mucky silt loam

Subsurface tier:
Color—hue of 2.5Y, 10YR, or neutral, value of 2 or 3, chroma of 0 to 3
Texture—sapric material

2Cg horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2
Texture—silt loam, silty clay loam, loam; thin strata of gravelly loamy sand in the lower part in some pedons

3Cg horizon (if it occurs):
Color—hue of 10YR, 2.5Y, or neutral, value of 4 or 5, chroma of 1 or 2
Texture—the gravelly analogs of loamy coarse sand or coarse sandy loam

Lippincott Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate in the subsoil and rapid in the substratum
Parent material: Glacial outwash
Landforms: Outwash plains and valley trains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Eldean, Savona

Taxonomic classification: Fine, mixed, mesic Typic Argiaquolls

Typical Pedon

Lippincott silty clay loam, about 2 miles southeast of Tremont City, in Moorefield Township; about 1,350 feet south and 520 feet east of the northwest corner of sec. 33, T. 5, R. 10:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; friable; few fine roots; few pebbles; slightly acid; abrupt smooth boundary.

A—7 to 13 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; common fine distinct strong brown (7.5YR 5/6) mottles in the lower part of the horizon; moderate medium subangular blocky structure; firm; few fine roots; few pebbles; slightly acid; clear wavy boundary.

Btg1—13 to 17 inches; dark gray (10YR 4/1) silty clay; common medium distinct yellowish brown (10YR 5/4) mottles; moderate fine and medium prismatic structure parting to moderate medium subangular blocky; very firm; many faint dark brown (7.5YR 4/2) clay films on faces of peds; common black (10YR 2/1) krotovinas; neutral; clear wavy boundary.

Btg2—17 to 23 inches; gray (10YR 5/1) clay; common medium prominent strong brown (7.5YR 5/6) and common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; very firm; common faint gray (10YR 5/1) clay films on faces of peds; common black (10YR 2/1) krotovinas; slightly alkaline; clear wavy boundary.

Btg3—23 to 27 inches; gray (10YR 5/1) clay loam; common medium prominent strong brown (7.5YR 5/6) and common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; few faint gray (10YR 5/1) clay films on faces of peds; few black (10YR 2/1) krotovinas; slightly alkaline; clear wavy boundary.

2BCg—27 to 34 inches; grayish brown (10YR 5/2) gravelly silt loam; common medium distinct brown (7.5YR 5/2) mottles; weak coarse subangular blocky structure; friable; about 25 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

2C—34 to 80 inches; brown (10YR 5/3) very gravelly loamy coarse sand; single grain; loose; about 55 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 25 to 40 inches
Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 20 to 40 inches
Content of rock fragments: A horizon—0 to 10 percent; Btg horizon—0 to 10 percent; 2BC horizon—15 to 60 percent; 2C horizon—35 to 70 percent

A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam, clay loam, mucky silt loam

Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 or 2
Texture—clay loam, silty clay loam, clay, silty clay

2BC horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—the gravelly or very gravelly analogs of loam, silt loam, or sandy loam

2C horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 3
Texture—the very gravelly or extremely gravelly analogs of sandy loam, sand, loamy sand, or loamy coarse sand

Miamian Series

Depth class: Very deep and deep
Drainage class: Well drained
Permeability: Moderately slow
Parent material: Glacial till and a thin layer of loess in places
Landforms: Till plains, kame terraces
Position on the landform: Backslopes, shoulders, summits, micro-highs
Slope range: 0 to 30 percent
Adjacent soils: Celina, Crosby, Kokomo
Taxonomic classification: Fine, mixed, mesic Typic Hapludalfs

Typical Pedon

Miamian silt loam, 2 to 6 percent slopes, about 3.5 miles south of Springfield, in Springfield Township; about 330 feet north and 840 feet east of the center of sec. 31, T. 5, R. 9:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; moderate fine granular structure; friable; common roots; neutral; abrupt smooth boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/4) silty

clay loam; moderate medium subangular blocky structure; friable; common roots; common faint brown (10YR 4/3) clay films on faces of peds; neutral; clear wavy boundary.

Bt2—14 to 20 inches; dark yellowish brown (10YR 4/4) clay; moderate medium subangular blocky structure; firm; common roots; many faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few rock fragments; neutral; clear wavy boundary.

Bt3—20 to 30 inches; dark yellowish brown (10YR 4/4) clay; moderate medium subangular blocky structure; firm; few roots; many faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct black (10YR 2/1) coatings (iron and manganese oxides) on faces of peds; about 5 percent rock fragments; neutral; clear wavy boundary.

Bt4—30 to 36 inches; yellowish brown (10YR 5/4) clay; moderate medium subangular blocky structure; firm; many faint yellowish brown (10YR 5/4) clay films on faces of peds; 5 percent rock fragments; slightly alkaline; clear wavy boundary.

C—36 to 80 inches; yellowish brown (10YR 5/4) loam; massive; very firm; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: 40 to 80 inches
Depth to carbonates: 18 to 40 inches
Thickness of the loess mantle: 0 to 18 inches
Content of rock fragments: Bt horizon—1 to 10 percent; C horizon—2 to 15 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam, silty clay loam, clay loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—clay, clay loam, or silty clay loam

C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—silt loam or loam

Milford Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow in the solum and moderately rapid in the substratum
Parent material: Stratified silty and clayey sediments underlain by sand and gravel
Landform: Lake plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Miamian
Taxonomic classification: Fine, mixed, mesic Typic Haplaquolls

Typical Pedon

Milford silty clay loam, sandy substratum, about 2 miles east of Selma, in Madison Township; about 1,120 feet north of the intersection of London Road and Wildman Road along Wildman Road, then 3,100 feet east:

Ap—0 to 10 inches; black (N 2/0) silty clay loam, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; friable; few fine roots; slightly alkaline; abrupt smooth boundary.

A—10 to 18 inches; black (10YR 2/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; few fine faint very dark grayish brown (10YR 3/2) mottles; moderate medium angular blocky structure; firm; few fine roots; slightly alkaline; clear wavy boundary.

Bg1—18 to 22 inches; very dark gray (10YR 3/1) silty clay; few fine faint grayish brown (10YR 5/2) mottles; moderate fine and medium angular blocky structure; firm; common fine roots; thin faint very dark gray (10YR 3/1) coatings on pressure faces on peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear wavy boundary.

Bg2—22 to 30 inches; dark grayish brown (2.5Y 4/2) silty clay; common medium prominent brown (7.5YR 5/4) and common medium distinct dark gray (N 4/0) mottles; moderate medium angular blocky structure; firm; thin faint very dark gray (10YR 3/1) coatings on pressure faces on peds; common black (10YR 2/1) krotovinas; few fine black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear wavy boundary.

Bg3—30 to 42 inches; gray (N 6/0) silty clay; common medium prominent olive yellow (2.5Y 6/6) mottles; moderate medium prismatic structure parting to weak coarse angular blocky; firm; common fine roots; common black (10YR 2/1) krotovinas; neutral; clear wavy boundary.

Bg4—42 to 55 inches; gray (N 5/0) silty clay loam; many coarse prominent olive (5Y 5/6) mottles; weak medium prismatic structure; firm; slightly

effervescent in the lower part; slightly alkaline; clear wavy boundary.

2Cg—55 to 64 inches; grayish brown (2.5Y 5/2) loam; many coarse distinct light olive brown (2.5Y 5/6) mottles; weak medium prismatic structure; firm; about 5 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

2C1—64 to 75 inches; brown (10YR 5/3) loamy coarse sand; single grain; loose; strongly effervescent; moderately alkaline; clear wavy boundary.

3C2—75 to 80 inches; brown (10YR 5/3) gravelly loamy coarse sand; single grain; loose; about 25 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 12 to 24 inches
Depth to carbonates: 40 to 55 inches
Content of rock fragments: 2C horizon—5 to 35 percent

A horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 2 or 3, chroma of 0 to 2
Texture—silty clay loam

Bg horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 3 to 6, chroma of 0 to 2
Texture—silty clay, silty clay loam, clay loam

2Cg, 2C, and 3C horizons:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—loam, loamy coarse sand, gravelly loamy coarse sand

Millsdale Series

Depth class: Moderately deep
Drainage class: Very poorly drained
Permeability: Moderately slow
Parent material: Glacial till and, in some pedons, the underlying residuum derived from limestone or dolomite
Landforms: Till plains and stream terraces
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Crosby, Kokomo, Miamian, Milton
Taxonomic classification: Fine, mixed, mesic Typic Argiaquolls

Typical Pedon

Millsdale silty clay loam, about 3.6 miles east of Enon, in Mad River Township; about 1,665 feet south and 2,530 feet west of the northeast corner of sec. 13, T. 4, R. 9:

Ap1—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many medium and fine roots; neutral; clear wavy boundary.

Ap2—6 to 12 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; common fine prominent light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; firm; many medium and fine roots; neutral; gradual wavy boundary.

Btg1—12 to 17 inches; very dark gray (N 3/0) silty clay, dark gray (10YR 4/1) dry; few fine distinct very dark grayish brown (2.5Y 3/2) and common medium distinct dark grayish brown (2.5Y 4/2) mottles; moderate medium subangular blocky structure; firm; common medium and fine roots; few faint very dark gray (10YR 3/1) clay films on faces of peds; many continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few faint black (N 2/0) concretions (iron and manganese oxides); common black (10YR 2/1) krotovinas; neutral; gradual wavy boundary.

Btg2—17 to 29 inches; dark gray (N 4/0) silty clay; common medium distinct olive brown (2.5Y 4/4) and few medium prominent light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; common medium and fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; few distinct black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear wavy boundary.

Btg3—29 to 34 inches; gray (N 6/0) silty clay loam; many coarse prominent light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; few grayish brown (10YR 5/2) clay films on vertical faces of peds; neutral; abrupt smooth boundary.

2R—34 to 37 inches; dolomite.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Thickness of the mollic epipedon: 10 to 18 inches
Depth to bedrock: 20 to 40 inches
Content of rock fragments: A horizon—0 to 10 percent; Btg horizon—0 to 10 percent

A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam

Btg horizon:
Color—hue of 10YR to 5Y or neutral, value of 3 to 7, chroma of 0 to 4
Texture—silty clay loam, silty clay, clay loam

Milton Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate or moderately slow
Parent material: Glacial till and, in some pedons, the underlying residuum derived from limestone or dolomite
Landform: Till plains
Position on the landform: Backslopes, shoulders, summits, micro-highs
Slope range: 0 to 6 percent
Adjacent soils: Miamian, Millsdale, Randolph
Taxonomic classification: Fine, mixed, mesic Typic Hapludalfs

Typical Pedon

Milton silt loam, 2 to 6 percent slopes, about 0.5 mile east of Enon, in Mad River Township; about 475 feet east and 975 feet north of the center of sec. 31, T. 4, R. 9:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; common fine roots; common faint dark brown (10YR 3/3) coatings on faces of peds; few rock fragments; neutral; abrupt smooth boundary.

Bt1—9 to 13 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few rock fragments; neutral; clear wavy boundary.

Bt2—13 to 23 inches; brown (7.5YR 4/4) clay; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds; few rock fragments, mostly dolomite; neutral; clear wavy boundary.

Bt3—23 to 31 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; common distinct brown (7.5YR 5/2) clay films on faces of peds; about 5 percent rock fragments, mostly dolomite; neutral; abrupt smooth boundary.

2R—31 to 34 inches; dolomite.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Content of rock fragments: A horizon—0 to 5 percent; Bt horizon—0 to 10 percent; 2Bt horizon—10 to 50 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—silty clay loam, clay loam, silty clay, clay

Ockley Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the solum and very rapid in the substratum
Parent material: Silty material, loamy outwash, and stratified sandy and gravelly outwash
Landforms: Outwash plains and stream terraces
Position on the landform: Footslopes, backslopes, shoulders, summits, micro-highs, treads
Slope range: 0 to 6 percent
Adjacent soils: Eldean, Lippincott, Westland
Taxonomic classification: Fine-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Ockley silt loam, 2 to 6 percent slopes, about 4.3 miles west of South Charleston, in Greene Township; about 160 feet west and 130 feet south of the northeast corner of sec. 5, T. 5, R. 8:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; common fine and very fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; common fine and very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; common distinct brown (10YR 4/3) coatings on faces of peds; very strongly acid; gradual wavy boundary.

2Bt2—15 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; common fine and very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct brown (10YR 4/3) coatings on faces of peds; very strongly acid; few pebbles; clear wavy boundary.

2Bt3—22 to 27 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine and very fine roots; common distinct brown (7.5YR 4/3) clay films on faces of peds; few pebbles; very strongly acid; clear wavy boundary.

2Bt4—27 to 36 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; few very fine roots; common distinct dark brown (7.5YR 4/3) clay films on faces of peds; few distinct dark brown (7.5YR 4/4) coatings on faces of peds; few pebbles; very strongly acid; gradual wavy boundary.

2Bt5—36 to 45 inches; dark brown (7.5YR 4/4) loam; weak coarse subangular blocky structure; very friable; few very fine roots; few pebbles; slightly acid; clear wavy boundary.

2Bt6—45 to 49 inches; dark brown (7.5YR 4/2) gravelly sandy clay loam; weak coarse subangular blocky structure; friable; few very fine roots; common distinct dark brown (7.5YR 3/2) clay films bridging sand grains; about 15 percent gravel; tongues extending 4 to 10 inches into the gravelly coarse sand and coarse sand; neutral; clear irregular boundary.

3C—49 to 80 inches; yellowish brown (10YR 5/4), stratified gravelly coarse sand and coarse sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 72 inches
Depth to carbonates: 40 to 72 inches
Thickness of the loess mantle: 0 to 20 inches
Content of rock fragments: Bt horizon—0 to 10 percent; 2Bt horizon—10 to 45 percent; 3C horizon—5 to 35 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3
Texture—silt loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 4 to 6
Texture—silt loam, silty clay loam

2Bt horizon:
Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 2 to 4
Texture—clay loam, loam, sandy clay loam, or the gravelly analogs of these textures

3C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—sand, coarse sand, loamy coarse sand, gravelly sand, gravelly coarse sand, very gravelly loamy coarse sand

Patton Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow
Parent material: Lacustrine sediments
Landform: Lake plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Miamian, Ockley
Taxonomic classification: Fine-silty, mixed, mesic Typic Haplaquolls

Typical Pedon

Patton silty clay loam, about 4 miles south of Springfield, in Springfield Township; about 1,870 feet south and 10 feet east of the center of sec. 25, T. 5, R. 9:

Ap1—0 to 5 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium and fine granular structure; friable; few fine and very fine roots; neutral; clear smooth boundary.

Ap2—5 to 12 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium angular blocky structure; firm; few fine and very fine roots; neutral; clear wavy boundary.

Bg1—12 to 15 inches; dark gray (N 4/0) silty clay loam; common medium distinct light olive brown (2.5Y 5/4) and common medium faint gray (N 5/0) mottles; moderate coarse and medium prismatic structure parting to weak medium angular blocky; firm; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bg2—15 to 22 inches; gray (N 5/0) silty clay loam; common medium distinct grayish brown (2.5Y 5/2) and common medium prominent light olive brown (2.5Y 5/4) mottles; moderate medium prismatic

structure parting to weak coarse angular blocky; firm; few very fine roots; common distinct dark gray (N 4/0) organic coatings on faces of peds; neutral; gradual wavy boundary.

BCg—22 to 36 inches; gray (5Y 5/1) silt loam; common medium distinct light olive brown (2.5Y 5/4) mottles; weak coarse prismatic structure; firm; few very fine roots; slightly effervescent in the lower part; slightly alkaline; gradual wavy boundary.

Cg1—36 to 65 inches; gray (N 5/0) silt loam with thin strata of loam; common medium distinct light olive brown (2.5Y 5/4) mottles; massive; firm; slightly effervescent; moderately alkaline; gradual wavy boundary.

Cg2—65 to 75 inches; dark gray (N 4/0) loam stratified with light olive brown (2.5Y 5/4) silt loam; massive; friable; slightly effervescent; moderately alkaline; clear wavy boundary.

Cg3—75 to 80 inches; dark gray (N 4/0) silt loam; massive; firm; slightly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 48 inches
Thickness of the mollic epipedon: 10 to 20 inches

Ap or A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam

Bg horizon:
Texture—silt loam, silty clay loam

Cg horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 4 or 5, chroma of 0 to 2
Texture—silt loam, silty clay loam, thin subhorizons of loam and fine sandy loam

Randolph Series

Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Parent material: Glacial till and, in some pedons, the underlying residuum derived from limestone or dolomite
Landform: Till plains
Position on the landform: Footslopes, micro-highs
Slope range: 0 to 2 percent
Adjacent soils: Celina, Crosby, Millsdale, Milton
Taxonomic classification: Fine, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Randolph silt loam, 0 to 2 percent slopes, about 2.7 miles northeast of New Carlisle, in Pike Township; about 1,564 feet south and 725 feet west of the center of sec. 18, R. 9, T. 3:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; common fine roots; few rock fragments; neutral; abrupt smooth boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint grayish brown (10YR 5/2) and few medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium and fine subangular blocky structure; firm; common fine roots; few distinct brown (10YR 4/3) coatings in worm channels; few fine black (10YR 2/1) stains (iron and manganese oxides); few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; many distinct grayish brown (10YR 5/2) silt coatings on faces of peds; few rock fragments; slightly acid; clear wavy boundary.

Bt2—14 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; moderate medium and fine subangular blocky structure; firm; few fine roots; few distinct brown (10YR 4/3) coatings in worm channels; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few rock fragments; slightly acid; clear wavy boundary.

Bt3—19 to 25 inches; brown (10YR 4/3) clay; common medium distinct grayish brown (10YR 5/2) and few medium distinct yellowish brown (10YR 5/4) mottles; weak medium and fine subangular blocky structure; firm; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 5 percent rock fragments; neutral; abrupt wavy boundary.

2R—25 to 28 inches; dolomite.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Content of rock fragments: Ap horizon—0 to 2 percent; Bt horizon—0 to 10 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 to 3
Texture—silt loam

Bt horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 3 or 4
Texture—clay, silty clay, silty clay loam, clay loam

Rodman Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderately rapid in the subsoil and very rapid in the substratum
Parent material: Stratified gravelly and sandy outwash
Landform: Kame moraines
Position on the landform: Backslopes
Slope range: 18 to 35 percent
Adjacent soils: Eldean, Lippincott, Miamian
Taxonomic classification: Sandy-skeletal, mixed, mesic Typic Hapludolls

Typical Pedon

Rodman gravelly loam, 18 to 35 percent slopes, about 2 miles southwest of Catawba, in Pleasant Township; about 1,610 feet north and 400 feet west of the center of sec. 27, T. 6, R. 10:

A—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; common fine roots; about 25 percent gravel, mostly limestone; slightly effervescent; moderately alkaline; clear wavy boundary.
Bw—7 to 12 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine granular structure; very friable; common fine roots; about 30 percent gravel, mostly limestone; slightly effervescent; moderately alkaline; clear wavy boundary.
C—12 to 80 inches; yellowish brown (10YR 5/4) extremely gravelly sand stratified with very gravelly coarse sand; single grain; loose; few fine roots in the upper 6 inches of the horizon; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 10 to 15 inches
Depth to carbonates: 10 to 15 inches
Content of rock fragments: A horizon—10 to 25 percent; Bw horizon—10 to 30 percent; C horizon—35 to 70 percent

A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—gravelly loam

Bw horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4
Texture—loam, sandy loam, or the gravelly and very gravelly analogs of these textures

C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—sand, coarse sand, or the gravelly to extremely gravelly analogs of these textures

Ross Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Alluvium
Landforms: Flood plains and low terraces
Position on the landform: Steps of flood plains, terrace treads
Slope range: 0 to 2 percent
Adjacent soils: Eldean, Lippincott, Tremont
Taxonomic classification: Fine-loamy, mixed, mesic Cumulic Hapludolls

Typical Pedon

Ross silty clay loam, rarely flooded, about 1 mile northwest of Enon, in Bethel Township; about 475 feet north and 1,190 feet west of the southeast corner of sec. 8, T. 3, R. 9:

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; friable; common fine and very fine roots; few pebbles; slightly effervescent; slightly alkaline; abrupt smooth boundary.
A—10 to 27 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium and fine granular structure; friable; few fine and very fine roots; few pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.
Bw—27 to 34 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium and fine granular structure; friable; few fine and very fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of

peds; about 5 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

C1—34 to 50 inches; brown (10YR 4/3) loam; massive; friable; few very fine roots; about 5 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—50 to 72 inches; brown (10YR 4/3) gravelly sandy loam with thin strata of silty clay loam; massive; friable; about 20 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C3—72 to 80 inches; dark yellowish brown (10YR 4/4) very gravelly coarse sandy loam; loose; single grain; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 45 inches
Thickness of the mollic epipedon: 24 to 40 inches
Content of coarse fragments: A horizon—0 to 8 percent; Bw horizon—0 to 10 percent; C horizon—0 to 45 percent

Ap or A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 to 3
Texture—silt loam, silty clay loam

Bw horizon:
Color—hue of 10YR, value of 3 or 4, chroma of 2 to 4
Texture—silt loam, loam

C horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 to 4
Texture—silt loam, loam, sandy loam, coarse sandy loam, or the gravelly or very gravelly analogs of these textures

Rush Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the solum and very rapid in the substratum
Parent material: Silty material underlain by loamy and gravelly outwash
Landforms: Outwash plains and outwash terraces
Position on the landform: Footslopes, micro-highs
Slope range: 0 to 2 percent
Adjacent soils: Eldean, Waupecan
Taxonomic classification: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

Rush silt loam, 0 to 2 percent slopes, about 0.5 mile east of New Moorefield, in Moorefield Township; about 1,320 feet west and 525 feet north of the southeast corner of sec. 4, T. 5, R. 10:

Ap—0 to 13 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—13 to 23 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; common fine roots; common faint yellowish brown (10YR 5/4) clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—23 to 31 inches; brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common faint brown (10YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3—31 to 39 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common faint brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt4—39 to 46 inches; strong brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; common faint brown (7.5YR 4/4) clay films on faces of peds; slightly acid; about 10 percent gravel; clear wavy boundary.

3BC—46 to 58 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; weak medium subangular blocky structure; friable; about 40 percent gravel; strongly effervescent; slightly alkaline; clear wavy boundary.

3C—58 to 80 inches; brown (10YR 5/3) very gravelly loamy coarse sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 55 to 80 inches
Thickness of the loess mantle: 24 to 40 inches
Content of rock fragments: Bt horizon—0 to 15 percent; 2Bt horizon—10 to 30 percent; 3BC horizon—25 to 60 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 4 to 6

Texture—silt loam, silty clay loam

2Bt horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 3 to 6
Texture—loam, clay loam, sandy clay loam

3BC horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 4 to 6
Texture—the gravelly or very gravelly analogs of sandy loam, coarse sandy loam, or loamy coarse sand

3C horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 2 to 4
Texture—the gravelly to extremely gravelly analogs of loamy coarse sand or coarse sand

Savona Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate or moderately slow in the solum and rapid in the underlying material
Parent material: Gravelly and sandy outwash
Landform: Outwash terraces
Position on the landform: Footslopes, micro-highs
Slope range: 0 to 2 percent
Adjacent soils: Eldean, Lippincott
Taxonomic classification: Fine, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Savona silt loam, 0 to 2 percent slopes, about 1.3 miles east of Tremont City, in German Township; about 345 feet north and 1,715 feet west of the southeast corner of sec. 5, T. 4, R. 10:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak fine and very fine granular structure; friable; few fine and very fine roots; few pebbles; strongly acid; abrupt wavy boundary.

BE—10 to 13 inches; yellowish brown (10YR 5/4) silt loam; common medium faint yellowish brown (10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; moderate fine and very fine subangular blocky structure; friable; few fine and very fine roots; many faint brown (10YR 5/3) and few distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; few pebbles; strongly acid; clear wavy boundary.

Bt1—13 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct brown (10YR 4/3) silt coatings on faces of peds; few pebbles; strongly acid; clear wavy boundary.

Bt2—18 to 26 inches; yellowish brown (10YR 5/4) clay; common medium faint yellowish brown (10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; many distinct grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) clay films on faces of peds; few dark grayish brown (10YR 4/2) silt coatings on faces of peds; about 5 percent gravel; slightly acid; clear wavy boundary.

Bt3—26 to 36 inches; dark grayish brown (10YR 4/2) gravelly clay; common medium faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine and very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 20 percent gravel; neutral; clear wavy boundary.

BC1—36 to 39 inches; dark grayish brown (10YR 4/2) gravelly silt loam; common medium faint brown (10YR 4/3) and common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few fine and very fine roots; about 35 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

BC2—39 to 47 inches; grayish brown (10YR 5/2) very gravelly sandy loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure parting to moderate medium and fine granular; very friable; few very fine roots; about 40 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—47 to 68 inches; stratified grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) extremely gravelly loamy coarse sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—68 to 80 inches; yellowish brown (10YR 5/4) extremely gravelly coarse sand; single grain; loose; about 70 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 30 to 55 inches
Depth to carbonates: 24 to 40 inches

Content of rock fragments: A horizon—0 to 5 percent; upper part of Bt horizon—0 to 15 percent; lower part of Bt horizon—15 to 35 percent; BC horizon—15 to 60 percent; C horizon—35 to 75 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 4
Texture—clay, clay loam, silty clay loam in the upper part; the gravelly analogs of clay, clay loam, sandy clay loam, or loam in the lower part

C horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 6
Texture—the very gravelly or extremely gravelly analogs of loamy sand, sand, loamy coarse sand, or coarse sand

Sloan Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate or moderately slow in the solum and rapid in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Steps
Slope range: 0 to 2 percent slopes
Adjacent soils: Lippincott, Ross
Taxonomic classification: Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls

Typical Pedon

Sloan silt loam, sandy substratum, occasionally flooded, about 1.3 miles east of Clifton, in Greene Township; about 265 feet west and 1,425 feet south of the northeast corner of sec. 26, T. 5, R. 8:

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium and fine granular structure; friable; many fine roots; neutral; clear wavy boundary.

A—10 to 17 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium granular structure; friable; common fine roots; slightly alkaline; gradual wavy boundary.

Bg1—17 to 23 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; friable; common fine roots; few fine black (10YR 2/1) concretions (iron and manganese oxides); slightly alkaline; clear wavy boundary.

Bg2—23 to 31 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine prominent olive brown (2.5Y 4/4) mottles; weak medium subangular blocky structure; firm; few fine black (10YR 2/1) concretions (iron and manganese oxides); slightly alkaline; clear wavy boundary.

C—31 to 40 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium faint light olive brown (2.5Y 5/6) and common medium distinct light gray (N 6/0) mottles; massive; friable; slightly alkaline; clear wavy boundary.

Cg1—40 to 48 inches; gray (N 5/0) silt loam; many coarse distinct olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/6) mottles; massive; friable; slightly alkaline; clear wavy boundary.

Cg2—48 to 56 inches; dark gray (N 4/0) silt loam; massive; friable; few shell fragments; about 5 percent gravel; slightly alkaline; clear wavy boundary.

Cg3—56 to 80 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand stratified with very gravelly loamy coarse sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 55 inches
Thickness of the mollic epipedon: 10 to 24 inches
Depth to carbonates: 22 to 60 inches
Content of rock fragments: A horizon—0 to 5 percent; B horizon—0 to 5 percent; C horizon—0 to 35 percent

A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silt loam

Bg horizon:
Color—hue of 10YR or 2.5Y, value of 2 to 5, chroma of 1 or 2
Texture—silty clay loam, clay loam

C horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 4 or 5, chroma of 0 to 3
Texture—silt loam, gravelly loamy coarse sand, very gravelly loamy coarse sand

Strawn Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow

Parent material: Glacial till
Landform: Till plains
Position on the landform: Backslopes, shoulders, summits, micro-highs
Slope range: 0 to 35 percent
Adjacent soils: Celina, Crosby, Kokomo, Miamian
Taxonomic classification: Fine-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Strawn silty clay loam, in an area of Celina-Strawn complex, 2 to 6 percent slopes, about 3 miles east of South Charleston, in Madison Township; about 1,850 feet west of the intersection of Huntington Road and Correll-Maxey Road (Township Road 57 in Madison County), along Huntington Road, then 260 feet south:

Ap—0 to 10 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; about 30 percent dark yellowish brown (10YR 4/4) material mixed from the subsoil; weak coarse subangular blocky structure; firm; few fine and very fine roots; few rock fragments; neutral; clear wavy boundary.

Bt—10 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few light gray (10YR 7/2), soft weathered limestone fragments; few rock fragments; slightly alkaline; gradual wavy boundary.

BC—16 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; few medium distinct yellowish brown (10YR 5/4) mottles; weak coarse and medium subangular blocky structure; firm; few fine and very fine roots; few faint brown (10YR 4/3) clay films on faces of peds; common distinct grayish brown (10YR 5/2) coatings of secondary lime on faces of peds; few rock fragments; slightly effervescent; slightly alkaline; gradual wavy boundary.

C1—23 to 52 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; very firm; few very fine roots in the upper part; common distinct light brownish gray (10YR 6/2) coatings of lime in vertical partings; few rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—52 to 80 inches; yellowish brown (10YR 5/4) clay loam; few distinct yellowish brown (10YR 5/6) mottles; massive; firm; common distinct light brownish gray (10YR 6/2) coatings of lime in vertical partings; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 16 to 24 inches
Depth to carbonates: 14 to 24 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 4
Texture—silt loam, silty clay loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4
Texture—silty clay loam, clay loam

BC horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—silty clay loam, clay loam

C horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 2 to 6
Texture—silt loam, loam, clay loam

Thackery Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part and rapid in the lower part
Parent material: Silty material or loess over outwash
Landforms: Outwash plains and outwash terraces
Position on the landform: Footslopes, micro-highs
Slope range: 0 to 2 percent
Adjacent soils: Miamian, Westland
Taxonomic classification: Fine-loamy, mixed, mesic Aquic Hapludalfs

Typical Pedon

Thackery silt loam, 0 to 2 percent slopes, about 3.5 miles west of South Charleston, in Madison Township; about 2,110 feet west and 1,295 feet south of the northeast corner of sec. 35, T. 6, R. 8:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); moderately acid; abrupt wavy boundary.

Bt1—11 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine and medium subangular blocky structure; firm; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); many fine brown (10YR 5/3) silt coatings on faces of peds; few fine dark

yellowish brown (10YR 4/4) clay films on faces of peds and in root channels; few pebbles; slightly acid; clear wavy boundary.

2Bt2—16 to 25 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); common fine brown (10YR 4/3) clay films in channels and on faces of peds; few pebbles; slightly acid; clear wavy boundary.

2Bt3—25 to 36 inches; brown (10YR 4/3) sandy clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium and coarse subangular blocky structure; firm; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); few medium distinct brown (10YR 4/3) clay films in pores and channels and on faces of peds; about 5 percent gravel; neutral; clear wavy boundary.

2BC—36 to 53 inches; brown (10YR 5/3) very gravelly sandy loam; weak medium granular structure; very friable; about 50 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

2C—53 to 80 inches; grayish brown (10YR 5/2) gravelly sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to carbonates: 32 to 55 inches
Thickness of the loess mantle: 0 to 30 inches
Content of rock fragments: 2Bt horizon—2 to 25 percent; 2BC and 2C horizons—15 to 70 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam

Bt horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 to 6
Texture—silt loam, silty clay loam

2Bt horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 to 6
Texture—clay loam, sandy clay loam, gravelly clay loam

2C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 4
Texture—sand, loamy sand, loamy coarse sand, or the gravelly to extremely gravelly analogs of these textures

Tremont Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Steps
Slope range: 0 to 2 percent
Adjacent soils: Lippincott, Ross, Sloan
Taxonomic classification: Fine-loamy, mixed (calcareous), mesic Cumulic Haplaquolls

Typical Pedon

Tremont silty clay loam, rarely flooded, about 2 miles west of Enon, in Mad River Township; about 130 feet north and 460 feet west of the southeast corner of sec. 13, T. 3, R. 9:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; firm; few medium and fine roots; few pebbles; slightly effervescent; moderately alkaline; abrupt wavy boundary.

A—7 to 13 inches; very dark gray (10YR 3/1) clay loam, very dark grayish brown (10YR 3/2) dry; weak coarse and medium subangular blocky structure; firm; few medium and fine roots; few pebbles; slightly effervescent; moderately alkaline; abrupt wavy boundary.

Ab1—13 to 21 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak fine and very fine granular structure; friable; few medium and fine roots; few pebbles; slightly effervescent; slightly alkaline; clear wavy boundary.

Ab2—21 to 29 inches; very dark gray (10YR 3/1) loam, very dark grayish brown (10YR 3/2) dry; weak medium prismatic structure parting to moderate medium and fine subangular blocky; firm; few medium and fine roots; few pebbles; slightly effervescent; moderately alkaline; clear wavy boundary.

Bgb1—29 to 37 inches; dark gray (10YR 4/1) loam; common medium prominent olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/4) mottles; moderate medium and fine subangular blocky structure; firm; about 5 percent gravel; few black (10YR 2/1) krotovinas; slightly effervescent; moderately alkaline; clear wavy boundary.

Bgb2—37 to 54 inches; gray (10YR 5/1) clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; firm; about 5 percent gravel; few black (10YR 2/1) krotovinas; slightly effervescent; slightly alkaline; clear wavy boundary.

2Cg1—54 to 64 inches; dark grayish brown (10YR 4/2) gravelly loam; single grain; loose; about 15 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

2Cg2—64 to 80 inches; dark gray (10YR 4/1) very gravelly coarse sandy loam; single grain; loose; about 40 percent gravel; slightly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 72 inches
Thickness of the mollic epipedon: 24 to 36 inches
Content of rock fragments: A horizon—0 to 5 percent; C or Cg horizon—0 to 10 percent; 2C or 2Cg horizon—15 to 60 percent

Ap and A horizons:
Color—hue of 10YR, value of 3 (4 or 5 dry), chroma of 1 to 3
Texture—silt loam, silty clay loam, clay loam

Ab horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—clay loam, silty clay loam, silt loam, loam

Bgb horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—clay loam, silty clay loam, silt loam, loam

Cg or C horizon (if it occurs):
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 4
Texture—clay loam, silty clay loam, silt loam, loam, and subhorizons of sandy loam or coarse sandy loam

2Cg or 2C horizon:
Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 4
Texture—the gravelly or very gravelly analogs of silt loam, loam, sandy loam, or coarse sandy loam; subhorizons of gravelly or very gravelly loamy sand

Wallkill Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate over moderately rapid or rapid
Parent material: Alluvium over organic soil material and the underlying loamy and gravelly material
Landform: Flood plains
Position on the landform: Steps
Slope range: 0 to 2 percent
Adjacent soils: Carlisle, Drummer
Taxonomic classification: Fine-loamy, mixed, nonacid, mesic Thapto-Histic Fluvaquents

Typical Pedon

Wallkill silt loam, occasionally flooded, about 1.8 miles southeast of Enon, in Mad River Township; about 345 feet west and 710 feet south of the northeast corner of sec. 35, T. 4, R. 8:

Ap—0 to 6 inches; very dark grayish brown (2.5Y 3/2) silt loam, grayish brown (2.5Y 5/2) dry; weak fine and very fine granular structure; friable; common medium and fine roots; slightly effervescent; slightly alkaline; clear wavy boundary.

Bg1—6 to 11 inches; dark gray (10YR 4/1) silt loam; common medium prominent brown (7.5YR 4/4) mottles; weak medium and fine subangular blocky structure; friable; common medium and fine roots; many faint dark gray (10YR 4/1) coatings on faces of peds; slightly effervescent; slightly alkaline; gradual wavy boundary.

Bg2—11 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium prominent brown (7.5YR 4/4) and common medium distinct grayish brown (10YR 5/2) mottles; weak medium and fine subangular blocky structure; firm; few medium and fine roots; common faint dark gray (10YR 4/1) coatings on faces of peds; slightly effervescent; slightly alkaline; gradual wavy boundary.

Bg3—16 to 19 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct brown (7.5YR 4/4) and grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure; firm; few very fine roots; common dark gray (10YR 4/1) coatings on faces of peds; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2Oa1—19 to 32 inches; black (10YR 2/1) sapric material, very dark brown (10YR 2/2) rubbed; about 5 percent fibers; massive; friable; few very fine roots; few sand grains and fine pebbles; neutral; gradual wavy boundary.

2Oa2—32 to 42 inches; sapric material, very dark brown (10YR 2/2) broken face and rubbed; about 15 percent fiber; massive; friable; few sand grains and fine pebbles; neutral; gradual wavy boundary.

2Oa3—42 to 53 inches; sapric material, very dark brown (10YR 2/2) broken face and rubbed; about 40 percent fibers; massive; friable; neutral; clear wavy boundary.

3Cg1—53 to 65 inches; dark gray (10YR 4/1) gravelly loam; massive; very friable; about 30 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

3Cg2—65 to 72 inches; dark gray (10YR 4/1) gravelly loam; massive; firm; about 20 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

3Cg3—72 to 80 inches; gray (10YR 5/1) very gravelly sandy loam; single grain; loose; about 45 percent gravel; slightly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mineral soil over the organic soil material: 16 to 40 inches
Content of rock fragments: 3C horizon—5 to 45 percent

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 to 4, chroma of 1 or 2
Texture—silt loam, silty clay loam, loam

Bg horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 5, chroma of 1 or 2
Texture—silt loam, loam, silty clay loam

Cg horizon (if it occurs):
Color—hue of 10YR or 2.5Y, value of 3 to 5, chroma of 1 or 2
Texture—silt loam, loam, silty clay loam

2O horizon:
Color—hue of 5YR to 2.5Y or neutral, value of 2 or 3, chroma of 0 to 2
Texture—sapric material

3Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—loam, sandy loam, or the gravelly and very gravelly analogs of these textures

Warsaw Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the subsoil and very rapid in the substratum
Parent material: Loamy material over outwash
Landforms: Outwash plains and outwash terraces
Position on the landform: Footslopes, micro-highs
Slope range: 0 to 3 percent
Adjacent soils: Eldean, Lippincott
Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls

Typical Pedon

Warsaw silt loam, 0 to 3 percent slopes, about 1.5 miles southeast of Eagle City, in Moorefield Township; about 240 feet east and 2,190 feet south of the northwest corner of sec. 31, T. 5, R. 10:

Ap—0 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium and fine granular structure; friable; common fine and very fine roots; few pebbles; moderately acid; clear wavy boundary.

Bt1—12 to 15 inches; brown (10YR 4/3) silty clay loam; weak medium and fine subangular blocky structure; friable; few fine and very fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common faint dark brown (10YR 3/3) clay films in pores and channels and on faces of peds; few pebbles; moderately acid; gradual wavy boundary.

Bt2—15 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common distinct dark brown (10YR 3/3) clay films in pores and channels and on faces of peds; few pebbles; slightly acid; clear wavy boundary.

2Bt3—22 to 29 inches; brown (10YR 4/3) gravelly clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; many distinct dark brown (7.5YR 3/2) clay films in pores and channels and on faces of peds; about 20 percent gravel; neutral; clear wavy boundary.

2Bt4—29 to 32 inches; brown (10YR 4/3) gravelly clay loam; moderate coarse and medium subangular blocky structure; friable; few fine and very fine roots; common faint dark brown (7.5YR 3/2) clay films in pores and channels and on faces of peds; about 30 percent gravel; neutral; abrupt wavy boundary.

2BC—32 to 36 inches; dark brown (7.5YR 3/2) gravelly sandy loam; weak coarse and medium subangular blocky structure; friable; few fine and very fine roots; about 35 percent gravel; slightly effervescent; slightly alkaline; clear irregular boundary.

2C—36 to 80 inches; brown (10YR 5/3) very gravelly coarse sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 40 inches

Thickness of the mollic epipedon: 10 to 22 inches
Depth to carbonates: 20 to 36 inches
Content of rock fragments: Ap horizon—0 to 5 percent; Bt horizon—0 to 30 percent; 2C horizon—30 to 60 percent

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 to 3
Texture—silt loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 2 to 4
Texture—silty clay loam, clay loam

2Bt horizon:
Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 2 to 4
Texture—gravelly clay loam or gravelly sandy clay loam

2C horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 2 to 4
Texture—gravelly or very gravelly coarse sand

Waupecan Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the subsoil and very rapid in the substratum
Parent material: Silty material over sandy and gravelly glacial outwash
Landforms: Outwash plains and outwash terraces
Position on the landform: Footslopes, micro-highs
Slope range: 0 to 2 percent
Adjacent soils: Eldean, Lippincott
Taxonomic classification: Fine-silty, mixed, mesic Typic Argiudolls

Typical Pedon

Waupecan silt loam, 0 to 2 percent slopes, about 4 miles east of Springfield, in Springfield Township; about 2,190 feet west and 90 feet south of the northeast corner of sec. 10, T. 5, R. 9:

Ap—0 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine and very fine roots; strongly acid; clear wavy boundary.

AB—13 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; few fine and very fine roots; strongly acid; gradual wavy boundary.

Bt1—17 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; few faint brown (10YR 4/3) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings in pores and channels and on faces of peds; strongly acid; gradual wavy boundary.

Bt2—24 to 35 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings in pores and channels and on faces of peds; strongly acid; clear wavy boundary.

2Bt3—35 to 39 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common distinct dark brown (7.5YR 3/2) clay films on faces of peds; about 5 percent gravel; strongly acid; gradual wavy boundary.

2Bt4—39 to 45 inches; brown (10YR 4/3) sandy clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common faint dark brown (7.5YR 3/2) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organo-clay coatings on faces of peds; about 10 percent gravel; strongly acid; gradual wavy boundary.

2Bt5—45 to 48 inches; brown (10YR 4/3) clay loam; weak medium subangular blocky structure; firm; few very fine roots; common faint dark brown (7.5YR 3/2) clay films on faces of peds; many distinct very dark gray (10YR 3/1) organo-clay coatings on faces of peds; about 10 percent gravel; neutral; clear wavy boundary.

2C1—48 to 54 inches; brown (10YR 4/3) gravelly loamy coarse sand; single grain; loose; about 30 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

2C2—54 to 80 inches; dark yellowish brown (10YR 4/4) very gravelly coarse sand; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 65 inches
Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the loess mantle: 24 to 48 inches

Content of rock fragments: 2Bt horizon—1 to 10 percent; 2C horizon—15 to 60 percent

A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silt loam

Bt horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 to 6
Texture—silt loam, silty clay loam

2Bt horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 3 to 6
Texture—silty clay loam, loam, clay loam, or sandy clay loam

2C horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 4 to 6
Texture—loamy coarse sand, coarse sand, or the gravelly and very gravelly analogs of these textures

Waynetown Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Silty material over loamy outwash
Landforms: Outwash plains and outwash terraces
Position on the landform: Footslopes, micro-highs
Slope range: 0 to 2 percent
Adjacent soils: Drummer, Rush
Taxonomic classification: Fine-silty, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Waynetown silt loam, 0 to 2 percent slopes, about 4.5 miles northwest of South Charleston, in Harmony Township; about 1,110 feet north and 1,425 feet west of the center of sec. 31, T. 6, R. 9:

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine and very fine roots; moderately acid; abrupt smooth boundary.

Bt1—11 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate fine and very fine subangular blocky structure; firm; common fine and very fine roots; many distinct grayish brown (2.5Y 5/2) coatings on faces of peds; few fine brown (10YR 4/3) clay films on faces of peds; few fine black (N 2/0) concretions (iron and manganese oxides); moderately acid; clear wavy boundary.

Bt2—16 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; moderate medium and fine subangular blocky structure; firm; common fine and very fine roots; many distinct grayish brown (10YR 5/2) coatings on faces of peds; many distinct dark grayish brown (10YR 4/2) clay films in pores and channels and on faces of peds; few fine black (N 2/0) concretions (iron and manganese oxides); slightly acid; clear wavy boundary.

Bt3—22 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine and very fine roots; common distinct grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) clay films in pores and channels and on faces of peds; few fine black (N 2/0) concretions (iron and manganese oxides); slightly acid; clear wavy boundary.

2Btg1—34 to 45 inches; grayish brown (10YR 5/2) clay loam; many medium distinct light grayish brown (10YR 6/2) and common medium distinct yellowish brown (10YR 5/4) mottles; moderate coarse and medium subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) clay films in pores and channels and on faces of peds; common light gray (10YR 7/2), soft weathered limestone fragments; about 5 percent gravel, mostly in the lower part; neutral; clear wavy boundary.

3Btg2—45 to 51 inches; dark gray (10YR 4/1) gravelly loam; many medium faint dark grayish brown (10YR 4/2) and few fine faint dark gray (10YR 4/1) mottles; weak coarse subangular blocky structure; firm; few fine dark grayish brown (10YR 4/2) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) clay films in pores and channels, bridging sand grains, and on faces of peds; few light gray (10YR 7/2), soft weathered limestone fragments; about 15 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

3BCg—51 to 66 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; weak coarse granular

structure; friable; about 35 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

3Cg—66 to 80 inches; gray (10YR 5/1) very gravelly coarse sand; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 50 to 80 inches
Thickness of the silty mantle: 20 to 40 inches
Content of rock fragments: 2Bt horizon—0 to 10 percent; 3Bt horizon—15 to 30 percent; 3Cg horizon—20 to 45 percent

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam

Bt horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 6
Texture—silt loam, silty clay loam

2Btg horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 to 4
Texture—clay loam or loam

3Bt horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—gravelly clay loam, gravelly sandy clay loam, gravelly loam

3Cg horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—gravelly or very gravelly coarse sand or loamy coarse sand

Westland Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate in the subsoil and very rapid in the substratum
Parent material: Silty material over loamy, sandy, and gravelly glacial outwash
Landforms: Outwash plains, outwash terraces, and valley trains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Eldean, Ockley, Ross
Taxonomic classification: Fine-loamy, mixed, mesic Typic Argiaquolls

Typical Pedon

Typical pedon of Westland silty clay loam, about 1.6 miles west of Pitchin, in Greene Township; about 950 feet south and 2,415 feet east of the center of sec. 29, T. 5, R. 8:

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; firm; few fine roots; few pebbles; slightly acid; clear wavy boundary.

Btg1—11 to 15 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure; firm; few fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; neutral; clear wavy boundary.

Btg2—15 to 22 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium and fine subangular blocky structure; firm; few fine roots; few faint dark grayish brown (10YR 4/2) clay films in pores and channels; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few pebbles; neutral; gradual wavy boundary.

Btg3—22 to 35 inches; grayish brown (10YR 5/2) clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; few faint dark grayish brown (10YR 4/2) clay films in pores and channels; few pebbles; neutral; clear wavy boundary.

2BCg—35 to 51 inches; dark gray (10YR 4/1) gravelly loam; weak coarse subangular blocky structure; friable; about 30 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

2Cg—51 to 80 inches; dark grayish brown (10YR 4/2) very gravelly coarse sand stratified with loamy coarse sand in the lower part; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 10 to 20 inches

Content of rock fragments: Ap horizon—0 to 4 percent; Btg horizon—0 to 15 percent; 2BC horizon—5 to 40 percent; 2C horizon—15 to 50 percent

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 or 3, chroma of 1 to 3
Texture—silty clay loam, silt loam

Btg horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 6, chroma of 1 or 2
Texture—silty clay loam or clay loam in the upper part; clay loam in the lower part

2BCg horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 6, chroma of 1 or 2
Texture—loam, clay loam, sandy loam, or the gravelly and very gravelly analogs of these textures

2C horizon:
Color—hue of 10YR, value of 3 to 6, chroma of 1 to 3
Texture—the gravelly and very gravelly analogs of coarse sand or loamy coarse sand

Detailed Soil Map Units

The map units on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given in Part II of this survey.

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit. The principal hazards and limitations to be considered in planning for specific uses are discussed in Part II of this survey.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Miamian silt loam, 2 to 6 percent slopes, is a phase of the Miamian series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Celina-Strawn complex, 0 to 2 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarry, is an example.

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see Contents in Part II) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Ad—Adrian muck, drained

Setting

Landform: Till plains, outwash plains
Position on the landform: Open depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface tier:
0 to 10 inches—black, very friable muck

Subsurface tier:
10 to 22 inches—very dark gray, very friable muck
22 to 28 inches—brown, loose very gravelly sandy loam

Substratum:
28 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Very poorly drained
Dominant parent material: Organic deposits over outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 55 to 75 percent
Potential for frost action: High
Available water capacity: 10.9 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 125 to 200 centimoles per kilogram in the surface layer
Other features: Organic soil layers
Similar components:

- Soils that have thinner organic deposits
- Soils that have less sand in the substratum

Composition

Adrian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Linwood soils near the center of depressions
- Lippincott soils interfingering along margins of the unit
- Westland soils interfingering along margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ae—Adrian muck, undrained

Setting

Landform: Till plains, outwash plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface tier:
0 to 10 inches—black, friable muck

Subsurface tier:
10 to 36 inches—black and dark brown, friable muck

Substratum:
36 to 80 inches—dark gray and dark grayish brown, friable and loose very gravelly sandy loam and very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Organic deposits over outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent

Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 55 to 75 percent
Potential for frost action: High
Available water capacity: 15.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 125 to 200 centimoles per kilogram in the surface layer
Other features: Organic soil layers
Similar components:
- Soils that have thinner organic deposits
- Soils that have less sand in the substratum

Composition

Adrian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Carlisle soils in the lower positions
- Linwood soils near the center of depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ca—Carlisle muck, drained

Setting

Landform: Till plains, outwash plains
Position on the landform: Open depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 30 acres

Typical Profile

Surface tier:
0 to 10 inches—black, very friable muck

Subsurface tier:
10 to 35 inches—dark brown and black, friable muck

Bottom tier:
35 to 80 inches—dark reddish brown and dark brown, friable muck

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Organic material
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 1.0 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 70 to 99 percent
Potential for frost action: High
Available water capacity: 24 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 150 to 230 centimoles per kilogram in the surface layer
Other features: Organic soil layers
Similar components:
- Soils that have strata of coprogenous earth and marl
- Soils that have thinner organic deposits

Composition

Carlisle and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Adrian soils on slight rises and near margins of the unit
- Linwood soils near margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Cb—Carlisle muck, undrained

Setting

Landform: Till plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 30 acres

Typical Profile

Surface tier:
0 to 10 inches—black, friable muck

Subsurface tier:
10 to 80 inches—dark brown, black, reddish brown, and dark reddish brown, friable muck

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Organic materials
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 1.0 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 70 to 99 percent
Potential for frost action: High
Available water capacity: 24 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 150 to 230 centimoles per kilogram in the surface layer
Other features: Organic soil layers
Similar components:
- Soils that have strata of coprogenous earth and marl
- Soils that have thinner organic deposits

Composition

Carlisle and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Adrian soils interfingering along the margins of the unit
- Linwood soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CcD2—Casco gravelly loam, 12 to 20 percent slopes, eroded

Setting

Landform: Outwash terraces
Position on the landform: Knolls, backslopes, shoulders
Size of areas: 5 to 15 acres

Typical Profile

Surface layer:
0 to 7 inches—dark brown, friable gravelly loam

Subsoil:
7 to 17 inches—dark brown and dark yellowish brown, friable clay loam and gravelly loam

Substratum:
17 to 80 inches—yellowish brown and brown, loose gravelly loamy coarse sand and gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Shallow to loose, sandy and gravelly outwash
Drainage class: Somewhat excessively drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 2 percent
Potential for frost action: Low
Available water capacity: 3.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.
Similar components:
- Soils that have more clay and gravel in the subsoil
- Soils in areas that are more severely eroded

Composition

Casco and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Eldean soils near the base of slopes
- Rodman soils at the center of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

CeA—Celina silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains
Position on the landform: Micro-highs
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam

Subsoil:
9 to 30 inches—dark yellowish brown and yellowish brown, firm, mottled clay and clay loam

Substratum:
30 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact till
Drainage class: Moderately well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 2.0 to 3.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 7.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer
Similar components:
- Soils in better drained areas
- Soils that have a thicker solum
- Soils that have less clay in the subsoil

Composition

Celina and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Crosby soils in depressions
- Kokomo soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

CeB—Celina silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Low knolls
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 8 inches—brown, friable silt loam

Subsoil:
8 to 16 inches—brown, firm silty clay loam
16 to 27 inches—dark yellowish brown and yellowish brown, mottled, firm clay and clay loam
27 to 32 inches—yellowish brown, firm clay loam

Substratum:
32 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact till
Drainage class: Moderately well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 2.0 to 3.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 7.7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer
Similar components:
- Soils in better drained areas
- Soils that have a thinner solum
- Soils that are moderately eroded

Composition

Celina and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Crosby soils in the lower positions
- Kokomo soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

ChA—Celina-Strawn complex, 0 to 2 percent slopes

Setting

Landform: Till plains
Position on the landform: Celina—footslopes, micro-lows; Strawn—micro-highs
Size of areas: 3 to 20 acres

Typical Profile

Celina

Surface layer:
0 to 9 inches—brown, friable silt loam

Subsoil:
9 to 30 inches—dark yellowish brown and yellowish brown, firm, mottled silty clay loam and clay loam

Substratum:
30 to 80 inches—yellowish brown, firm loam

Strawn

Surface layer:
0 to 6 inches—brown, firm silt loam

Subsoil:
6 to 21 inches—brown and yellowish brown, firm silty clay loam

Substratum:
21 to 80 inches—yellowish brown, very firm silt loam and loam

Soil Properties and Qualities

Celina

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 2.0 to 3.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 8.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer
Similar components:
- Soils that have a thinner solum
- Soils that have more clay in the subsoil

Strawn

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 8.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 13 to 22 centimoles per kilogram in the surface layer

Composition

Celina and similar soils: 50 percent
Strawn and similar soils: 35 percent
Inclusions: 15 percent

Inclusions

- Crosby soils in depressions
- Kokomo soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

ChB—Celina-Strawn complex, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Celina—footslopes, backslopes, micro-lows; Strawn—shoulders, summits
Size of areas: 5 to 30 acres

Typical Profile

Celina

Surface layer:
0 to 10 inches—brown, friable silt loam

Subsoil:
10 to 30 inches—brown and dark yellowish brown, firm silty clay loam

Substratum:
30 to 80 inches—yellowish brown, firm loam

Strawn

Surface layer:
0 to 10 inches—brown, firm silty clay loam

Subsoil:
10 to 23 inches—dark yellowish brown, firm silty clay loam

Substratum:
23 to 80 inches—yellowish brown, very firm and firm silt loam and clay loam

Soil Properties and Qualities

Celina

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact till
Drainage class: Moderately well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 2.0 to 3.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 8.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer
Similar components:
- Soils in better drained areas
- Soils that are moderately eroded

Strawn

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 2 percent
Potential for frost action: Moderate
Available water capacity: 7.9 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer

Composition

Celina and similar soils: 50 percent
Strawn and similar soils: 35 percent
Inclusions: 15 percent

Inclusions

- Crosby soils in depressions
- Kokomo soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

CrA—Crosby silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains
Position on the landform: Micro-highs

Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable silt loam

Subsoil:
9 to 25 inches—dark yellowish brown, mottled, firm clay

Substratum:
25 to 80 inches—yellowish brown, mottled, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact till
Drainage class: Somewhat poorly drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 0.5 foot to 1.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 6 to 20 centimoles per kilogram in the surface layer
Similar components:
- Soils that have a thicker solum
- Soils that have less clay in the subsoil

Composition

Crosby and similar soils: 70 percent
Inclusions: 30 percent

Inclusions

- Celina soils on slight rises
- Kokomo soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

CrB—Crosby silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable silt loam

Subsoil:
9 to 35 inches—dark yellowish brown, mottled, firm clay loam

Substratum:
35 to 80 inches—yellowish brown, mottled, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact till
Drainage class: Somewhat poorly drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 0.5 foot to 1.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 6 to 20 centimoles per kilogram in the surface layer
Similar components:
- Soils that have a thicker solum

Composition

Crosby and similar soils: 70 percent
Inclusions: 30 percent

Inclusions

- Celina soils on low knolls
- Kokomo soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DoE—Donnelsville channery silt loam, 18 to 30 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, footslopes
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 11 inches—black, friable channery silt loam

Subsurface layer:
11 to 21 inches—dark grayish brown, friable channery silt loam

Subsoil:
21 to 36 inches—dark yellowish brown, friable very channery silt loam and very channery loam

Substratum:
36 to 47 inches—dark yellowish brown, friable extremely channery loam

Bedrock:
47 to 50 inches—dolomite

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 5 to 10 percent
Potential for frost action: Moderate
Available water capacity: 2.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 15 to 24 centimoles per kilogram in the surface layer
Other features: Channers on the surface
Similar components:
- Soils that have more clay in the subsoil

Composition

Donnelsville and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Milton soils near small rock outcrops and on small benches

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DpF—Donnelsville-Rock outcrop complex, 30 to 70 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes
Size of areas: 10 to 40 acres

Typical Profile

Donnelsville

Surface layer:
0 to 14 inches—very dark gray, friable very channery loam

Subsoil:
14 to 30 inches—brown and yellowish brown, friable extremely channery loam

Substratum:
30 to 55 inches—light yellowish brown, friable extremely channery loam

Bedrock:
55 to 58 inches—dolomite

Soil Properties and Qualities

Donnelsville

Depth class: Deep (40 to 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 5 to 10 percent
Potential for frost action: Moderate
Available water capacity: 3.8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 15 to 24 centimoles per kilogram in the surface layer

Composition

Donnelsville and similar soils: 70 percent
Rock outcrop: 15 percent
Inclusions: 15 percent

Inclusions

- Miamian soils that have a limestone substratum; near small areas of Rock outcrop and on small benches

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Dr—Drummer silty clay loam, gravelly substratum

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 20 to 150 acres

Typical Profile

Surface layer:
0 to 15 inches—very dark gray, firm silty clay loam

Subsoil:
15 to 42 inches—dark gray and gray, mottled, firm silty clay loam
42 to 47 inches—grayish brown, mottled, friable silt loam

Substratum:
47 to 80 inches—dark gray, loose gravelly loamy sand and very gravelly sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Poorly drained
Dominant parent material: Silty deposits over outwash
Native plant cover: Prairie grasses
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 2.0 feet below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 5 to 7 percent
Potential for frost action: High
Available water capacity: 9.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 16 to 35 centimoles per kilogram in the surface layer

Composition

Drummer and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Thackery and Waynetown soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EmA—Eldean silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash terraces
Position on the landform: Treads, micro-highs
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—dark yellowish brown, friable silt loam

Subsoil:
10 to 31 inches—brown, friable and firm clay loam, clay, and gravelly clay
31 to 38 inches—brown, firm very gravelly loam

Substratum:
38 to 80 inches—dark yellowish brown, loose extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Composition

Eldean and similar soils: 75 percent
Inclusions: 25 percent

Inclusions

- Lippincott soils in depressions and drainageways
- Ockley soils in concave positions
- Savona soils in depressions
- Westland soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EmB—Eldean silt loam, 2 to 6 percent slopes

Setting

Landform: Outwash terraces
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 10 inches—dark yellowish brown, friable silt loam

Subsoil:
10 to 31 inches—brown and dark reddish brown, firm silty clay loam, gravelly clay, and very gravelly clay loam

Substratum:
31 to 80 inches—dark yellowish brown, loose extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Depth to the water table: Greater than 6 feet
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 4.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Composition

Eldean and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Lippincott soils in depressions and drainageways
- Ockley soils in the flatter positions
- Savona soils near the base of sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EmB2—Eldean silt loam, 2 to 6 percent slopes, eroded

Setting

Landform: Outwash terraces
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 8 inches—dark yellowish brown, friable silt loam

Subsoil:
8 to 18 inches—dark brown, firm clay
18 to 24 inches—yellowish brown, firm very gravelly loam

Substratum:
24 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 4.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 75 percent
Inclusions: 25 percent

Inclusions

- Ockley soils in the flatter positions
- Westland soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EmC2—Eldean silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Outwash terraces
Position on the landform: Risers
Size of areas: 5 to 15 acres

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown, friable silt loam

Subsoil:
9 to 22 inches—dark brown, friable clay loam and firm clay
22 to 28 inches—brown and dark yellowish brown, firm clay and very gravelly clay
28 to 35 inches—yellowish brown, loose very gravelly sandy loam

Substratum:
35 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 4.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Miamian soils on shoulders

Management

For general and detailed information about

managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

EnC2—Eldean-Casco complex, 6 to 12 percent slopes, eroded

Setting

Landform: Outwash terraces
Position on the landform: Eldean—backslopes; Casco—shoulders
Size of areas: 5 to 20 acres

Typical Profile

Eldean

Surface layer:
0 to 7 inches—brown, friable clay loam

Subsoil:
7 to 22 inches—brown, firm gravelly clay loam
22 to 28 inches—dark yellowish brown, friable very gravelly sandy loam

Substratum:
28 to 80 inches—yellowish brown, loose extremely gravelly loamy sand

Casco

Surface layer:
0 to 7 inches—dark brown, friable gravelly loam

Subsoil:
7 to 19 inches—brown, friable clay loam and gravelly clay loam

Substratum:
19 to 80 inches—brown, loose very gravelly coarse sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 4.3 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Casco

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Somewhat excessively drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 2 percent
Potential for frost action: Low
Available water capacity: 3.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent
Casco and similar soils: 30 percent
Inclusions: 20 percent

Inclusions

- Miamian soils on slope breaks to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

EpB2—Eldean-Miamian complex, 2 to 6 percent slopes, eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes,

shoulders; Miamian—shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Eldean

Surface layer:
0 to 7 inches—brown, firm silty clay loam

Subsoil:
7 to 17 inches—dark yellowish brown and brown, firm clay loam and clay
17 to 21 inches—dark grayish brown, firm gravelly clay loam
21 to 26 inches—yellowish brown, friable gravelly sandy loam

Substratum:
26 to 80 inches—dark yellowish brown, loose gravelly loamy coarse sand

Miamian

Surface layer:
0 to 8 inches—brown, friable silty clay loam

Subsoil:
8 to 29 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:
29 to 80 inches—brown, firm silt loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 4.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 7.9 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent
Miamian and similar soils: 35 percent
Inclusions: 15 percent

Inclusions

- Ockley soils in the less sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

EpC2—Eldean-Miamian complex, 6 to 12 percent slopes, eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits
Size of areas: 10 to 80 acres

Typical Profile

Eldean

Surface layer:
0 to 6 inches—dark grayish brown, firm silt loam

Subsoil:
6 to 22 inches—dark yellowish brown and dark brown, firm clay loam and clay
22 to 30 inches—dark brown, friable gravelly clay loam
30 to 35 inches—yellowish brown, loose very gravelly sandy loam

Substratum:
35 to 80 inches—brown, loose very gravelly loamy sand

Miamian

Surface layer:
0 to 6 inches—brown, friable silt loam

Subsoil:
6 to 27 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:
27 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 4.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent
Miamian and similar soils: 35 percent
Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes
- Westland soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EpC3—Eldean-Miamian complex, 6 to 12 percent slopes, severely eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Eldean

Surface layer:
0 to 5 inches—dark brown, firm clay loam

Subsoil:
5 to 20 inches—dark brown, firm gravelly clay loam

Substratum:
20 to 80 inches—brown and yellowish brown, loose gravelly and very gravelly loamy coarse sand stratified with loamy sand and loamy fine sand

Miamian

Surface layer:
0 to 7 inches—brown, firm clay loam

Subsoil:
7 to 28 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:
28 to 80 inches—brown and yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 3.5 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent
Miamian and similar soils: 35 percent
Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EpD2—Eldean-Miamian complex, 12 to 18 percent slopes, eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders
Size of areas: 10 to 40 acres

Typical Profile

Eldean

Surface layer:
0 to 6 inches—dark grayish brown, friable silt loam

Subsoil:
6 to 21 inches—dark yellowish brown, firm and very firm clay loam and clay
21 to 26 inches—dark brown, firm gravelly clay loam

Substratum:
26 to 80 inches—brown, loose gravelly loamy coarse sand

Miamian

Surface layer:
0 to 5 inches—dark grayish brown, friable silt loam

Subsoil:
5 to 15 inches—dark yellowish brown, firm silty clay loam and clay loam
15 to 22 inches—yellowish brown, firm loam

Substratum:
22 to 80 inches—brown and yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate

Available water capacity: 4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 6.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent
Miamian and similar soils: 40 percent
Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EpD3—Eldean-Miamian complex, 12 to 18 percent slopes, severely eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits
Size of areas: 10 to 40 acres

Typical Profile

Eldean

Surface layer:
0 to 5 inches—dark brown, firm clay loam

Subsoil:
5 to 19 inches—dark yellowish brown, firm clay loam
19 to 24 inches—dark brown, firm gravelly clay loam

Substratum:
24 to 80 inches—brown, loose gravelly loamy sand

Miamian

Surface layer:
0 to 6 inches—brown, firm clay loam

Subsoil:
6 to 22 inches—dark yellowish brown, firm clay loam

Substratum:
22 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 3.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None

Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent
Miamian and similar soils: 40 percent
Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EpE2—Eldean-Miamian complex, 18 to 30 percent slopes, eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits
Size of areas: 10 to 20 acres

Typical Profile

Eldean

Surface layer:
0 to 3 inches—dark grayish brown, friable silt loam

Subsoil:
3 to 5 inches—yellowish brown, friable loam
5 to 24 inches—brown and dark yellowish brown, firm silty clay loam and clay loam
24 to 35 inches—dark brown, friable gravelly loam

Substratum:
35 to 80 inches—dark yellowish brown and yellowish brown gravelly loamy sand and coarse sand

Miamian

Surface layer:
0 to 5 inches—dark grayish brown, friable silt loam

Subsoil:
5 to 37 inches—yellowish brown, firm silty clay loam and clay loam

Substratum:
37 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 4.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent
Miamian and similar soils: 40 percent
Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes
- Rodman soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EsE3—Eldean-Rodman complex, 18 to 30 percent slopes, severely eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—shoulders, summits; Rodman—backslopes
Size of areas: 10 to 20 acres

Typical Profile

Eldean

Surface layer:
0 to 3 inches—brown, friable clay loam

Subsoil:
3 to 27 inches—strong brown and dark brown, firm clay and gravelly clay loam

Substratum:
27 to 80 inches—dark yellowish brown, loose gravelly coarse sand

Rodman

Surface layer:
0 to 11 inches—very dark grayish brown, friable gravelly loam

Subsoil:
11 to 15 inches—dark yellowish brown, very friable very gravelly sandy loam

Substratum:
15 to 80 inches—yellowish brown, loose, stratified coarse sand and very gravelly coarse sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Rodman

Depth class: Very deep (more than 60 inches)
Root zone: Shallow to loose, sandy and gravelly outwash
Drainage class: Excessively drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 2 to 4 percent
Potential for frost action: Moderate
Available water capacity: 3 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 5 to 18 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent
Rodman and similar soils: 40 percent
Inclusions: 15 percent

Inclusions

- Miamian soils on slope breaks to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EuB—Eldean-Urban land complex, 2 to 6 percent slopes

Setting

Landform: Outwash terraces
Position on the landform: Shoulders, summits
Size of areas: 50 to 100 acres

Typical Profile

Eldean

Surface layer:
0 to 10 inches—dark brown, friable silt loam

Subsurface layer:
10 to 25 inches—brown, firm silty clay loam and gravelly clay loam

Subsoil:
25 to 31 inches—dark reddish brown, firm very gravelly clay loam

Substratum:
31 to 80 inches—brown, loose extremely gravelly loamy sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Eldean and similar soils: 45 percent
Urban land: 40 percent
Inclusions: 15 percent

Inclusions

- Lippincott soils in depressions and drainageways
- Savona soils near the base of sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EuC—Eldean-Urban land complex, 6 to 12 percent slopes

Setting

Landform: Outwash terraces
Position on the landform: Shoulders, summits
Size of areas: 20 to 50 acres

Typical Profile

Eldean

Surface layer:
0 to 9 inches—dark yellowish brown, friable silt loam

Subsoil:
9 to 22 inches—dark brown, friable clay loam and firm clay
22 to 30 inches—brown and dark yellowish brown, firm clay and very gravelly clay
30 to 35 inches—yellowish brown, loose very gravelly sandy loam

Substratum:
35 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5.2 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Eldean and similar soils: 45 percent
Urban land: 40 percent
Inclusions: 15 percent

Inclusions

- Miamian soils on slope breaks to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ge—Genesee silt loam, till substratum, rarely flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, friable silt loam

Subsoil:
10 to 25 inches—brown, friable silt loam
25 to 48 inches—brown, mottled, friable loam and silt loam

Substratum:
48 to 70 inches—dark yellowish brown and yellowish brown, friable and loose gravelly loam and gravelly loamy sand
70 to 80 inches—dark gray, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Rare
Kind of water table: Apparent
Depth to the water table: 3 to 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 10.3 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 9 to 21 centimoles per kilogram in the surface layer

Composition

Genesee and similar soils: 100 percent

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Gn—Genesee silt loam, till substratum, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 11 inches—brown, friable silt loam

Substratum:
11 to 42 inches—brown and yellowish brown, friable loam
42 to 52 inches—grayish brown, mottled, friable loam
52 to 72 inches—brown and dark yellowish brown, loose gravelly sandy loam and gravelly coarse sand
72 to 80 inches—gray, mottled, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Occasional

Kind of water table: Apparent
Seasonal high water table: 3 to 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 11.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 9 to 21 centimoles per kilogram in the surface layer

Composition

Genesee and similar soils: 75 percent
Inclusions: 25 percent

Inclusions

- Sloan soils in sloughs and oxbows
- Ockley soils on low benches adjacent to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ko—Kokomo silty clay loam

Setting

Landform: Till plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 20 to several hundred acres

Typical Profile

Surface layer:
0 to 11 inches—very dark gray, firm silty clay loam

Subsurface layer:
11 to 19 inches—very dark gray, mottled, firm silty clay loam

Subsoil:
19 to 52 inches—grayish brown and light brownish gray, mottled, firm silty clay loam

Substratum:
52 to 80 inches—yellowish brown, mottled, calcareous, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 0.5 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 3 to 6 percent
Potential for frost action: High
Available water capacity: 9.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 16 to 33 centimoles per kilogram in the surface layer

Composition

Kokomo and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Celina soils on slight rises
- Crosby soils on slight rises
- Strawn soils on slight rises and low knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Lg—Linwood muck, undrained

Setting

Landform: Till plains, outwash plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface tier:
0 to 14 inches—black, very friable muck (sapric material)

Subsurface tier:
14 to 36 inches—black, friable muck

Substratum:
36 to 80 inches—gray and dark gray, friable silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Organic deposits over glacial deposits
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 40 to 70 percent
Potential for frost action: High
Available water capacity: 18.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 150 to 230 centimoles per kilogram in the surface layer
Other features: Organic soil layers

Composition

Linwood and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Adrian soils on slight rises
- Lippincott soils interfingering along the margins of the unit
- Westland soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Lh—Linwood mucky silt loam, drained

Setting

Landform: Till plains, outwash plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface tier:
0 to 9 inches—black, very friable mucky silt loam

Subsurface tier:
9 to 28 inches—black and very dark gray, firm muck

Substratum:
28 to 80 inches—dark gray and gray, firm silt loam and gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Organic deposits over glacial deposits
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 10 to 20 percent
Potential for frost action: High
Available water capacity: 14.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 30 centimoles per kilogram in the surface layer
Other features: Organic soil layers

Composition

Linwood and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Adrian soils on slight rises
- Patton soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Lm—Lippincott mucky silt loam

Setting

Landform: Till plains, outwash plains
Position on the landform: Footslopes, depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 10 to 30 acres

Typical Profile

Surface layer:
0 to 14 inches—black, friable mucky silt loam

Subsoil:
14 to 31 inches—very dark gray and grayish brown, mottled, firm silty clay loam
31 to 42 inches—grayish brown, mottled, firm silt loam

Substratum:
42 to 80 inches—brown and grayish brown, mottled, friable and loose gravelly loamy sand and gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 10 to 20 percent
Potential for frost action: Moderate
Available water capacity: 8.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 28 to 56 centimoles per kilogram in the surface layer

Composition

Lippincott and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Adrian soils in depressions and drainageways
- Patton soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Lp—Lippincott silty clay loam

Setting

Landform: Till plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 20 to 200 acres

Typical Profile

Surface layer:
0 to 7 inches—black, friable silty clay loam

Subsurface layer:
7 to 13 inches—black, mottled, firm silty clay loam

Subsoil:
13 to 27 inches—dark gray and gray, mottled, firm and very firm silty clay, clay, and clay loam
27 to 34 inches—grayish brown, mottled, friable gravelly silt loam

Substratum:
34 to 80 inches—brown, loose very gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 4 to 8 percent
Potential for frost action: Moderate
Available water capacity: 6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 20 to 40 centimoles per kilogram in the surface layer

Composition

Lippincott and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Savona soils on slight rises
- Westland soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Lu—Lippincott-Urban land complex

Setting

Landform: Outwash plains
Position on the landform: Footslopes, open depressions, drainageways
Size of areas: 20 to 40 acres

Typical Profile

Lippincott

Surface layer:
0 to 7 inches—black, friable silty clay loam

Subsurface layer:
7 to 13 inches—black, mottled, firm silty clay loam

Subsoil:
13 to 23 inches—dark gray and gray, mottled, firm silty clay, clay, and clay loam
23 to 29 inches—grayish brown, mottled gravelly silt loam

Substratum:
29 to 80 inches—brown, loose very gravelly loamy coarse sand

Soil Properties and Qualities

Lippincott

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 4 to 8 percent
Potential for frost action: Moderate
Available water capacity: 6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 20 to 40 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Lippincott and similar soils: 50 percent
Urban land: 35 percent
Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises
- Savona soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MgB2—Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders
Size of areas: 10 to 30 acres

Typical Profile

Surface layer:
0 to 8 inches—brown, firm silty clay loam

Subsoil:
8 to 25 inches—dark yellowish brown and yellowish brown, very firm and firm clay and clay loam

Substratum:
25 to 47 inches—yellowish brown, firm loam

Bedrock:
47 to 50 inches—limestone

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till over limestone
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 6.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Milton soils in dissected areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MgC2—Miamian silty clay loam, limestone substratum, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 10 acres

Typical Profile

Surface layer:
0 to 7 inches—brown, firm silty clay loam

Subsoil:
7 to 25 inches—dark yellowish brown and yellowish brown, firm and very firm clay loam and clay

Substratum:
25 to 53 inches—yellowish brown, firm loam

Bedrock:
53 to 56 inches—limestone

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till over limestone
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 6.5 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Milton soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MgE2—Miamian silty clay loam, limestone substratum, 18 to 30 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders
Size of areas: 10 to 20 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown, firm silty clay loam

Subsoil:
5 to 26 inches—dark yellowish brown and brown, firm and very firm silty clay loam and clay

Substratum:
26 to 43 inches—yellowish brown, firm silt loam

Bedrock:
43 to 46 inches—limestone

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till over limestone
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Donnelsville soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MhA—Miamian silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains
Position on the landform: Micro-highs
Size of areas: 5 to 80 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, friable silt loam

Subsoil:
10 to 22 inches—yellowish brown, friable silt loam and silty clay loam
22 to 37 inches—yellowish brown, firm silty clay loam and clay loam

Substratum:
37 to 80 inches—yellowish brown and dark yellowish brown, firm loam and clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 8.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Crosby soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section

- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MhB—Miamian silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders
Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, friable silt loam

Subsoil:
10 to 14 inches—yellowish brown, friable silty clay loam
14 to 36 inches—dark yellowish brown and yellowish brown, firm clay

Substratum:
36 to 80 inches—yellowish brown, very firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Celina soils in the more sloping areas and near margins of the unit
- Crosby soils near the base of sloping areas
- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MhB2—Miamian silt loam, 2 to 6 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable silt loam

Subsoil:
8 to 30 inches—dark yellowish brown and yellowish brown, firm silty clay loam and clay

Substratum:
30 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Celina soils in the more sloping areas and near margins of the unit

- Crosby soils near the base of sloping areas
- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MhC—Miamian silt loam, 6 to 12 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown, friable silt loam

Subsoil:
4 to 9 inches—dark yellowish brown, friable silty clay loam
9 to 34 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:
34 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Kokomo soils in draws and potholes
- Celina soils in drainageways
- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MhC2—Miamian silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 6 inches—brown, friable silt loam

Subsoil:
6 to 27 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:
27 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Celina soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MhD2—Miamian silt loam, 12 to 18 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown, friable silt loam

Subsoil:
5 to 8 inches—brown, friable silt loam
8 to 22 inches—yellowish brown, firm silty clay loam and clay
22 to 31 inches—dark yellowish brown and yellowish brown, firm silty clay loam and silt loam

Substratum:
31 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.3 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MhE—Miamian silt loam, 18 to 30 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 10 to 80 acres

Typical Profile

Surface layer:
0 to 4 inches—dark grayish brown, friable silt loam

Subsoil:
4 to 8 inches—yellowish brown, friable silt loam
8 to 38 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:
38 to 80 inches—yellowish brown, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MhE2—Miamian silt loam, 18 to 30 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 10 to 80 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown, friable silt loam

Subsoil:
5 to 37 inches—yellowish brown, firm silty clay loam and clay loam

Substratum:
37 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MkB2—Miamian silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 7 inches—brown, firm silty clay loam

Subsoil:
7 to 23 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:
23 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland

Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Crosby soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MkC2—Miamian silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 7 inches—brown, firm silty clay loam

Subsoil:
7 to 23 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:
23 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MkD2—Miamian silty clay loam, 12 to 18 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 6 inches—brown, firm silty clay loam

Subsoil:
6 to 20 inches—dark yellowish brown and yellowish brown, firm clay

Substratum:
20 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained

Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MmC3—Miamian clay loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 7 inches—brown, firm clay loam

Subsoil:
7 to 19 inches—dark yellowish brown, very firm clay loam and clay
19 to 28 inches—yellowish brown, firm clay loam

Substratum:
28 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.3 to 1.0 percent
Potential for frost action: Moderate
Available water capacity: 6.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Miamian and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Kokomo soils in draws and potholes
- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MmD3—Miamian clay loam, 12 to 18 percent slopes, severely eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 5 inches—brown, firm clay loam

Subsoil:
5 to 20 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:
20 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.3 to 1.0 percent
Potential for frost action: Moderate
Available water capacity: 6.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MmE3—Miamian clay loam, 18 to 30 percent slopes, severely eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 4 inches—brown, firm clay loam

Subsoil:
4 to 20 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:
20 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.3 to 1.0 percent
Potential for frost action: Moderate
Available water capacity: 6.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MnB—Miamian-Urban land complex, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 50 to 100 acres

Typical Profile

Miamian

Surface layer:
0 to 10 inches—dark brown, friable silt loam

Subsoil:
10 to 14 inches—yellowish brown, friable silty clay loam
14 to 36 inches—dark yellowish brown and yellowish brown, firm clay

Substratum:
36 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Miamian and similar soils: 50 percent
Urban land: 45 percent
Inclusions: 5 percent

Inclusions

- Crosby soils near the base of sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MnC—Miamian-Urban land complex, 6 to 12 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 50 to 100 acres

Typical Profile

Miamian

Surface layer:
0 to 4 inches—very dark grayish brown, friable silt loam

Subsoil:
4 to 9 inches—dark yellowish brown, friable silty clay loam
9 to 34 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:
34 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.5 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Miamian and similar soils: 50 percent
Urban land: 30 percent
Inclusions: 20 percent

Inclusions

- Celina soils in the flatter positions
- Crosby soils in concave parts of slopes and near the base of sloping areas
- Eldean soils in the more sloping areas
- Kokomo soils in draws and depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Mo—Milford silty clay loam, sandy substratum

Setting

Landform: Lake plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 20 to several hundred acres

Typical Profile

Surface layer:
0 to 10 inches—black, friable silty clay loam

Subsurface layer:
10 to 18 inches—black, mottled, firm silty clay loam

Subsoil:
18 to 42 inches—very dark gray, dark grayish brown, and gray, mottled, firm silty clay

Substratum:
42 to 55 inches—gray, mottled, firm silty clay loam
55 to 80 inches—grayish brown and brown, firm loam and loose loamy coarse sand and gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Dominant parent material: Lacustrine deposits over outwash
Native plant cover: Prairie grasses
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 1.0 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 4 to 6 percent
Potential for frost action: High
Available water capacity: 11.5 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 26 to 36 centimoles per kilogram in the surface layer

Composition

Milford and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Linwood soils in the more depressional positions
- Thackery soils on slight rises
- Waynetown soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Ms—Millsdale silty clay loam

Setting

Landform: Till plains, stream terraces
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 6 inches—very dark gray, friable silty clay loam

Subsurface layer:
6 to 12 inches—very dark gray, mottled, firm silty clay loam

Subsoil:
12 to 34 inches—very dark gray, dark gray, and gray, mottled, firm silty clay and silty clay loam

Bedrock:
34 to 37 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Till and limestone residuum
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched

Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 4 to 7 percent
Potential for frost action: High
Available water capacity: 5.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 20 to 36 centimoles per kilogram in the surface layer

Composition

Millsdale and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Randolph soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MtA—Milton silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains
Position on the landform: Micro-highs
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silt loam

Subsoil:
10 to 18 inches—yellowish brown, firm silty clay loam and clay loam
18 to 23 inches—dark brown, firm clay

Bedrock:
23 to 26 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Till and limestone residuum
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 22 centimoles per kilogram in the surface layer

Composition

Milton and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MtB—Milton silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 9 inches—dark brown, friable silt loam

Subsoil:
9 to 23 inches—dark yellowish brown and brown, firm silty clay loam and clay
23 to 31 inches—brown, firm clay loam

Bedrock:
31 to 34 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Till and limestone residuum
Native plant cover: Woodland
Flooding: None

Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 22 centimoles per kilogram in the surface layer

Composition

Milton and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MvC2—Milton silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 6 inches—brown, firm silty clay loam

Subsoil:
6 to 22 inches—dark yellowish brown and yellowish brown, firm silty clay loam and clay

Bedrock:
22 to 25 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Till and limestone residuum
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 3.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 16 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Milton and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MxB—Milton-Urban land complex, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 20 to 100 acres

Typical Profile

Milton

Surface layer:
0 to 9 inches—dark brown, friable silt loam

Subsoil:
9 to 31 inches—dark yellowish brown and brown, firm silty clay loam and clay

Bedrock:
31 to 34 inches—dolomite

Soil Properties and Qualities

Milton

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained

Dominant parent material: Till and limestone residuum
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 22 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Milton and similar soils: 50 percent
Urban land: 35 percent
Inclusions: 15 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

OcA—Ockley silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Treads, micro-highs
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam

Subsoil:
9 to 15 inches—brown, friable silt loam
15 to 34 inches—dark brown and strong brown, friable silty clay loam and clay loam
34 to 43 inches—dark brown and brown, firm gravelly clay loam

Substratum:
43 to 80 inches—yellowish brown and dark yellowish brown, loose loamy coarse sand and very gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Deep to sand and gravel
Drainage class: Well drained
Dominant parent material: Silty material or loess and outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer

Composition

Ockley and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises
- Westland soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

OcB—Ockley silt loam, 2 to 6 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Footslopes, backslopes, shoulders, summits
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam

Subsoil:
9 to 45 inches—dark yellowish brown and dark brown, firm and friable silty clay loam, clay loam, and loam
45 to 49 inches—dark brown, friable gravelly clay loam

Substratum:
49 to 80 inches—yellowish brown, loose gravelly coarse sand stratified with coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Deep to sand and gravel
Drainage class: Well drained
Dominant parent material: Silty material or loess and outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 8.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer

Composition

Ockley and similar soils: 75 percent
Inclusions: 25 percent

Inclusions

- Westland soils in depressions and draws
- Eldean soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Pa—Patton silty clay loam

Setting

Landform: Lake plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 20 to several hundred acres

Typical Profile

Surface layer:
0 to 12 inches—black, friable and firm silty clay loam

Subsoil:
12 to 36 inches—dark gray and gray, mottled, firm silty clay loam and silt loam

Substratum:
36 to 80 inches—gray and dark gray, firm and friable silt loam and loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Lacustrine deposits
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 2.0 feet below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 3 to 5 percent
Potential for frost action: High
Available water capacity: 12 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 22 to 31 centimoles per kilogram in the surface layer

Composition

Patton and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Linwood soils
- Milford soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Pg—Pits, gravel

Setting

Landform: Till plains
Size of areas: 2 to 100 acres

Soil Properties and Qualities

Definition: Open excavations from which gravel and sand have been removed

Composition

Pits, gravel: 100 percent

Ph—Pits, quarry

Setting

Landform: Till plains
Size of areas: 20 to 100 acres

Soil Properties and Qualities

Definition: Areas where dolomite has been quarried

Composition

Pits, quarry: 100 percent

RaA—Randolph silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains
Position on the landform: Micro-highs
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silt loam

Subsoil:
10 to 19 inches—yellowish brown and dark yellowish brown, mottled, firm silty clay loam
19 to 25 inches—brown, mottled, firm clay

Bedrock:
25 to 28 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Till and limestone residuum
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 4.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 22 centimoles per kilogram in the surface layer

Composition

Randolph and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Celina soils on slight rises
- Millsdale soils in draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RgE—Rodman gravelly loam, 18 to 35 percent slopes

Setting

Landform: Kame moraines
Position on the landform: Backslopes
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown, very friable gravelly loam

Subsoil:
7 to 12 inches—dark yellowish brown, very friable gravelly sandy loam

Substratum:
12 to 80 inches—yellowish brown, loose extremely gravelly sand and gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Shallow to sand and gravel
Drainage class: Excessively drained
Dominant parent material: Outwash
Native plant cover: Woodland

Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 2 to 4 percent
Potential for frost action: Low
Available water capacity: 2.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 5 to 18 centimoles per kilogram in the surface layer

Composition

Rodman and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils in the less sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Rn—Ross silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 20 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, friable silt loam

Subsoil:
10 to 27 inches—dark brown, friable silt loam

Substratum:
27 to 48 inches—brown and yellowish brown, friable silt loam
48 to 66 inches—grayish brown, friable loam and silt loam
66 to 80 inches—brown, loose very gravelly coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Occasional
Kind of water table: Apparent
Depth to the water table: 4 to 6 feet
Content of organic matter in the surface layer: 3 to 5 percent
Potential for frost action: Moderate
Available water capacity: 11.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 26 centimoles per kilogram in the surface layer

Composition

Ross and similar soils: 75 percent
Inclusions: 25 percent

Inclusions

- Tremont soils in the lower positions
- Sloan soils in sloughs and oxbows

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ro—Ross silty clay loam, rarely flooded

Setting

Landform: Flood plains, stream terraces
Position on the landform: Steps on flood plains, terrace treads
Slope range: 0 to 2 percent
Size of areas: 50 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—very dark gray, friable silty clay loam

Subsurface layer:
10 to 27 inches—very dark gray, friable silt loam

Subsoil:
27 to 34 inches—very dark grayish brown, friable silt loam

Substratum:

34 to 72 inches—brown, friable loam and gravelly sandy loam with thin strata of silty clay loam

72 to 80 inches—dark yellowish brown, loose very gravelly coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Rare
Kind of water table: Apparent
Depth to the water table: 4 to 6 feet
Content of organic matter in the surface layer: 3 to 5 percent
Potential for frost action: Moderate
Available water capacity: 9.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 17 to 29 centimoles per kilogram in the surface layer

Composition

Ross and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Waupecan soils in the higher positions
- Eldean soils on low knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

RuA—Rush silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Micro-highs
Size of areas: 20 to 100 acres

Typical Profile

Surface layer:

0 to 13 inches—brown, friable silt loam

Subsoil:

13 to 39 inches—yellowish brown and brown, friable silt loam

39 to 46 inches—brown, firm sandy clay loam

46 to 58 inches—yellowish brown, friable very gravelly sandy loam

Substratum:

58 to 80 inches—brown, loose very gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Deep to sand
Drainage class: Well drained
Dominant parent material: Silty material or loess over outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: High
Available water capacity: 10 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 5 to 16 centimoles per kilogram in the surface layer

Composition

Rush and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Westland soils in depressions
- Eldean soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

ScA—Savona silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Micro-highs

Size of areas: 20 to 40 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silt loam

Subsoil:
10 to 13 inches—yellowish brown, mottled, friable silt loam
13 to 26 inches—yellowish brown, mottled, firm silty clay loam and clay
26 to 36 inches—dark grayish brown, mottled, firm gravelly clay
36 to 47 inches—dark grayish brown and grayish brown, mottled, friable and very friable gravelly silt loam and very gravelly sandy loam

Substratum:
47 to 80 inches—grayish brown and yellowish brown, loose extremely gravelly loamy coarse sand and extremely gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Somewhat poorly drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Depth to the water table: 1.0 to 2.5 feet
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Potential for frost action: High
Available water capacity: 7.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 21 centimoles per kilogram in the surface layer

Composition

Savona and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

So—Sloan silt loam, sandy substratum, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 20 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—very dark gray, friable silt loam

Subsurface layer:
10 to 17 inches—black, friable silt loam

Subsoil:
17 to 23 inches—black, friable silty clay loam
23 to 31 inches—dark grayish brown, mottled, firm silty clay loam

Substratum:
31 to 56 inches—light olive brown, gray, and dark gray, mottled, friable silty clay loam and silt loam
56 to 80 inches—grayish brown, loose gravelly and very gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Occasional
Kind of water table: Apparent
Seasonal high water table: At the surface to 1 foot below the surface
Content of organic matter in the surface layer: 3 to 6 percent
Potential for frost action: High
Available water capacity: 11.3 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 13 to 26 centimoles per kilogram in the surface layer

Composition

Sloan and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Adrian soils in depressions and oxbows
- Ross soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

StB2—Strawn silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 6 inches—dark yellowish brown, firm silty clay loam

Subsoil:
6 to 20 inches—brown and yellowish brown, firm silty clay loam and clay loam

Substratum:
20 to 80 inches—yellowish brown, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 2 percent
Potential for frost action: Moderate
Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Crosby soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

StC2—Strawn silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 10 to 80 acres

Typical Profile

Surface layer:
0 to 6 inches—brown, firm silty clay loam

Subsoil:
6 to 20 inches—brown and dark yellowish brown, firm silty clay loam and clay loam

Substratum:
20 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 2 percent
Potential for frost action: Moderate
Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Kokomo soils in depressions and draws
- Eldean soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

StD2—Strawn silty clay loam, 12 to 18 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 10 to 60 acres

Typical Profile

Surface layer:
0 to 4 inches—brown, firm silty clay loam

Subsoil:
4 to 16 inches—brown and dark yellowish brown, firm silty clay loam and clay loam

Substratum:
16 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 2 percent
Potential for frost action: Moderate
Available water capacity: 7.3 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Eldean soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

StE2—Strawn silty clay loam, 18 to 35 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 10 acres

Typical Profile

Surface layer:
0 to 4 inches—brown, firm silty clay loam

Subsoil:
4 to 15 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:
15 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 2 percent
Potential for frost action: Moderate
Available water capacity: 7.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 100 percent

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

SuA—Strawn-Crosby complex, 0 to 2 percent slopes

Setting

Landform: Till plains
Position on the landform: Strawn—micro-highs; Crosby—footslopes, micro-lows
Size of areas: 5 to 50 acres

Typical Profile

Strawn

Surface layer:
0 to 9 inches—brown, friable silt loam

Subsoil:
9 to 18 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:
18 to 80 inches—brown, mottled, firm loam

Crosby

Surface layer:
0 to 9 inches—grayish brown, friable silt loam

Subsoil:
9 to 25 inches—dark yellowish brown, mottled, firm clay

Substratum:
25 to 80 inches—yellowish brown, mottled, firm loam

Soil Properties and Qualities

Strawn

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 13 to 22 centimoles per kilogram in the surface layer

Crosby

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Somewhat poorly drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 0.5 foot to 1.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 6 to 20 centimoles per kilogram in the surface layer

Composition

Strawn and similar soils: 55 percent
Crosby and similar soils: 30 percent
Inclusions: 15 percent

Inclusions

- Celina soils in the flatter positions
- Kokomo soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

SuB—Strawn-Crosby complex, 2 to 6 percent slopes

Setting

Landform: Till plains

Position on the landform: Strawn—shoulders, summits; Crosby—footslopes, micro-lows
Size of areas: 5 to 50 acres

Typical Profile

Strawn

Surface layer:
0 to 10 inches—brown, friable silt loam

Subsoil:
10 to 17 inches—dark yellowish brown and yellowish brown, firm silty clay loam and clay loam

Substratum:
17 to 80 inches—brown, mottled, firm loam

Crosby

Surface layer:
0 to 10 inches—grayish brown, friable silt loam

Subsoil:
10 to 30 inches—yellowish brown, mottled, firm clay

Substratum:
30 to 80 inches—yellowish brown, mottled, firm loam

Soil Properties and Qualities

Strawn

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 13 to 22 centimoles per kilogram in the surface layer

Crosby

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Somewhat poorly drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 0.5 foot to 1.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 5.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 6 to 20 centimoles per kilogram in the surface layer

Composition

Strawn and similar soils: 55 percent
Crosby and similar soils: 30 percent
Inclusions: 15 percent

Inclusions

- Kokomo soils in depressions and draws
- Celina soils in the flatter positions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

ThA—Thackery silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Micro-highs
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 11 inches—brown, friable silt loam

Subsoil:
11 to 16 inches—yellowish brown, mottled, firm silty clay loam
16 to 36 inches—dark yellowish brown and brown, mottled, firm clay loam and sandy clay loam
36 to 53 inches—brown, very friable very gravelly sandy loam

Substratum:
53 to 80 inches—grayish brown, loose gravelly sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to sand and gravel

Drainage class: Moderately well drained
Dominant parent material: Silty material or loess over outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Depth to the water table: 2.0 to 3.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Composition

Thackery and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Savona soils on low knolls
- Waynetown soils on low knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Tr—Tremont silty clay loam, rarely flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 40 to 200 acres

Typical Profile

Surface layer:
0 to 7 inches—very dark gray, firm silty clay loam

Subsurface layer:
7 to 13 inches—very dark gray, firm clay loam

Buried soil:
13 to 29 inches—black and very dark gray, friable and firm clay loam and loam
29 to 54 inches—dark gray and gray, mottled, firm loam and clay loam

Substratum:
54 to 80 inches—dark grayish brown and dark gray, loose gravelly loam and very gravelly coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Rare
Kind of water table: Apparent
Depth to the water table: 1.5 to 3.0 feet
Content of organic matter in the surface layer: 4 to 7 percent
Potential for frost action: High
Available water capacity: 11.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 20 to 24 centimoles per kilogram in the surface layer

Composition

Tremont and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Eldean soils on slight rises
- Westland soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ts—Tremont silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 50 to several hundred acres

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable silt loam

Subsurface layer:
9 to 18 inches—very dark grayish brown, friable silt loam

Buried soil:
18 to 28 inches—black, friable silty clay loam
28 to 40 inches—very dark gray and gray, mottled, friable silty clay loam and loam

Substratum:
40 to 80 inches—grayish brown, brown, and dark gray, friable and loose loam, coarse sandy loam, and very gravelly coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Occasional
Kind of water table: Apparent
Depth to the water table: 1.5 to 3.0 feet
Content of organic matter in the surface layer: 4 to 7 percent
Potential for frost action: High
Available water capacity: 11.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 20 to 24 centimoles per kilogram in the surface layer

Composition

Tremont and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Sloan soils in sloughs and oxbows

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ud—Udorthents, loamy

Setting

Landform: Till plains, outwash plains
Position on the landform: Side slopes
Slope range: 0 to 2 percent
Size of areas: 15 to 60 acres
Shape of areas: Generally angular

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
General description: This map unit consists of soils in areas that have been disturbed by earth moving and grading. The remaining soil material is similar to that in the underlying material of the adjacent soils.

Composition

Udorthents and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Relatively undisturbed soils at the edge of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ur—Urban land

Setting

Landform: Till plains, outwash plains
Size of areas: 80 to 120 acres

General Description

- Most areas are used for parking lots, streets, business centers, or small industrial establishments.

Composition

Urban land: 90 percent
Inclusions: 10 percent

Inclusions

- Eldean soils intermixed throughout the unit
- Miamian soils intermixed throughout the unit

Wc—Wallkill silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent

Size of areas: 10 to 30 acres

Typical Profile

Surface layer:
0 to 6 inches—very dark grayish brown, friable silt loam

Subsoil:
6 to 19 inches—dark gray and dark grayish brown, mottled, friable and firm silt loam and silty clay loam

Underlying organic soil:
19 to 53 inches—black and very dark brown, friable sapric material

Substratum of underlying soil:
53 to 80 inches—dark gray and gray, very friable, firm, and loose gravelly loam and very gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Alluvium over organic material over outwash
Native plant cover: Woodland
Frequency of flooding: Occasional
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 1.0 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 4 to 12 percent
Potential for frost action: High
Available water capacity: 19.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 40 centimoles per kilogram in the surface layer
Other features: Buried soil layers

Composition

Wallkill and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Carlisle soils in swamps
- Sloan soils in depressions and oxbows

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

WeA—Warsaw silt loam, 0 to 3 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Footslopes, micro-highs
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 12 inches—very dark grayish brown, friable silt loam

Subsoil:
12 to 22 inches—brown and dark yellowish brown, friable and firm silty clay loam and clay loam
22 to 32 inches—brown and dark brown, firm and friable gravelly clay loam
32 to 36 inches—dark brown, friable gravelly sandy loam

Substratum:
36 to 80 inches—brown, loose very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to sand and gravel
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Prairie grasses
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 2 to 5 percent
Potential for frost action: Moderate
Available water capacity: 7.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 25 centimoles per kilogram in the surface layer

Composition

Warsaw and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises
- Savona soils in swales and depressions
- Waupecan soils in the higher positions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

WpA—Waupecan silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Micro-highs
Size of areas: 30 to 100 acres

Typical Profile

Surface layer:
0 to 13 inches—very dark grayish brown, friable silt loam

Subsurface layer:
13 to 17 inches—very dark grayish brown, friable silt loam

Subsoil:
17 to 35 inches—yellowish brown, firm silty clay loam
35 to 48 inches—dark yellowish brown and brown, firm clay loam and sandy clay loam

Substratum:
48 to 80 inches—brown and dark yellowish brown, loose gravelly loamy coarse sand and very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Deep to sand and gravel
Drainage class: Well drained
Dominant parent material: Silty material or loess over outwash
Native plant cover: Prairie grasses
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 4 to 5 percent
Potential for frost action: High
Available water capacity: 9.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 17 to 26 centimoles per kilogram in the surface layer

Composition

Waupecan and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Warsaw soils in the higher positions
- Waynetown soils along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

WrA—Waynetown silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Footslopes, micro-highs
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 11 inches—dark grayish brown, friable silt loam

Subsoil:
11 to 34 inches—yellowish brown, mottled, firm silty clay loam
34 to 45 inches—grayish brown, mottled, firm clay loam
45 to 66 inches—dark gray and dark grayish brown, firm and friable gravelly loam and gravelly sandy loam

Substratum:
66 to 80 inches—gray, loose very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Silty material over loamy outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Depth to the water table: 0.5 foot to 2.0 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: High
Available water capacity: 10.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 5 to 16 centimoles per kilogram in the surface layer

Composition

Waynetown and similar soils: 80 percent
Inclusions: 20 percent

Inclusions

- Drummer soils in depressions and drainageways
- Thackery soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Wt—Westland silty clay loam

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 10 to several hundred acres

Typical Profile

Surface layer:
0 to 11 inches—very dark gray, firm silty clay loam

Subsoil:
11 to 35 inches—dark gray and grayish brown, mottled, firm silty clay loam and loam
35 to 51 inches—dark gray, friable gravelly loam

Substratum:
51 to 80 inches—dark grayish brown, loose very gravelly coarse sand and loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Silty material over outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 2 to 5 percent
Potential for frost action: High
Available water capacity: 8.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 15 to 31 centimoles per kilogram in the surface layer

Composition

Westland and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Savona soils on slight rises
- Waynetown soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Woodland" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. The normal flood plain of a stream, subject to flooding.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric

layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field*

capacity, normal moisture capacity, or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or

unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Krotovinas. Irregular tubular streaks within one layer of material transported from another layer. Caused by the filling of tunnels made by burrowing animals in one layer with material from outside the layer. They appear as rounded or elliptical volumes of various sizes. They may have colors contrasting (light or dark) with those of the layer in which they appear, and their texture and structure may be unlike those of the soil around them.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct

lake, filled in by well sorted, stratified sediments.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The

rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in

diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil

normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Springfield, Ohio)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	33.4	16.1	24.7	62	-15	11	2.12	1.12	3.00	5	2.2
February---	37.2	18.1	27.7	66	-10	25	1.84	.84	2.69	4	4.1
March------	48.8	28.7	38.7	77	2	121	2.63	1.67	3.49	6	.4
April------	60.4	38.0	49.2	85	18	304	3.25	1.94	4.42	7	.1
May--------	71.4	48.4	59.9	88	29	619	4.25	2.48	5.83	8	.0
June-------	80.1	58.1	69.1	92	40	866	4.26	2.62	5.74	7	.0
July-------	83.8	61.9	72.9	95	47	1,017	4.13	2.34	5.72	7	.0
August-----	82.4	59.5	70.9	94	44	951	3.88	1.96	5.54	6	.0
September--	75.9	51.8	63.9	91	33	714	2.95	1.45	4.25	5	.0
October----	63.6	40.0	51.8	83	21	373	2.69	1.56	3.69	5	.1
November---	50.7	32.4	41.6	74	11	153	3.07	1.61	4.35	6	.4
December---	39.2	22.9	31.0	65	-6	40	2.76	1.55	3.83	6	2.3
Yearly:											
Average---	60.6	39.7	50.1	---	---	---	---	---	---	---	---
Extreme---	100	-26	---	96	-17	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,194	37.82	31.72	42.81	72	9.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Springfield, Ohio)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 19	Apr. 30	May 14
2 years in 10 later than--	Apr. 15	Apr. 26	May 9
5 years in 10 later than--	Apr. 7	Apr. 19	Apr. 29
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 14	Oct. 2	Sept. 27
2 years in 10 earlier than--	Oct. 20	Oct. 8	Sept. 30
5 years in 10 earlier than--	Oct. 30	Oct. 20	Oct. 7

Table 3.--Growing Season

(Recorded in the period 1961-90 at Springfield, Ohio)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	185	161	141
8 years in 10	192	168	148
5 years in 10	205	182	160
2 years in 10	218	196	172
1 year in 10	224	203	178

Table 4.--Classification of the Soils

(This classification does not include recent amendments to soil taxonomy for cation-exchange activity, particle-size modifier, and dual mineralogy for strongly contrasting classes. More detailed information is available at local offices of the Natural Resources Conservation Service)

Soil name	Family or higher taxonomic class
Adrian	Terric Medisaprists, sandy or sandy-skeletal, mixed, euic, mesic
Carlisle	Typic Medisaprists, euic, mesic
Casco	Typic Hapludalfs, fine-loamy over sandy or sandy-skeletal, mixed, mesic
Celina	Aquic Hapludalfs, fine, mixed, mesic
Crosby	Aeric Ochraqualfs, fine, mixed, mesic
Donnelsville	Eutrochreptic Rendolls, loamy-skeletal, carbonatic, mesic
Drummer	Typic Haplaquolls, fine-silty, mixed, mesic
Eldean	Typic Hapludalfs, fine, mixed, mesic
Genesee	Fluventic Eutrochrepts, fine-loamy, mixed, mesic
Kokomo	Typic Argiaquolls, fine, mixed, mesic
Linwood	Terric Medisaprists, loamy, mixed, euic, mesic
Lippincott	Typic Argiaquolls, fine, mixed, mesic
Miamian	Typic Hapludalfs, fine, mixed, mesic
Milford	Typic Haplaquolls, fine, mixed, mesic
Millsdale	Typic Argiaquolls, fine, mixed, mesic
Milton	Typic Hapludalfs, fine, mixed, mesic
Ockley	Typic Hapludalfs, fine-loamy, mixed, mesic
Patton	Typic Haplaquolls, fine-silty, mixed, mesic
Randolph	Aeric Ochraqualfs, fine, mixed, mesic
Rodman	Typic Hapludolls, sandy-skeletal, mixed, mesic
Ross	Cumulic Hapludolls, fine-loamy, mixed, mesic
Rush	Typic Hapludalfs, fine-silty, mixed, mesic
Savona	Aeric Ochraqualfs, fine, mixed, mesic
Sloan	Fluvaquentic Haplaquolls, fine-loamy, mixed, mesic
Strawn	Typic Hapludalfs, fine-loamy, mixed, mesic
Thackery	Aquic Hapludalfs, fine-loamy, mixed, mesic
Tremont	Cumulic Haplaquolls, fine-loamy, mixed (calcareous), mesic
Udorthents	Typic Udorthents, fine-loamy, mixed, mesic
Wallkill	Thapto-Histic Fluvaquents, fine-loamy, mixed, nonacid, mesic
Warsaw	Typic Argiudolls, fine-loamy over sandy or sandy-skeletal, mixed, mesic
Waupecan	Typic Argiudolls, fine-silty, mixed, mesic
Waynetown	Aeric Ochraqualfs, fine-silty, mixed, mesic
Westland	Typic Argiaquolls, fine-loamy, mixed, mesic

Table 5.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
Ad	Adrian muck, drained	803	0.3
Ae	Adrian muck, undrained	247	*
Ca	Carlisle muck, drained	125	*
Cb	Carlisle muck, undrained	509	0.2
CcD2	Casco gravelly loam, 12 to 20 percent slopes, eroded	534	0.2
CeA	Celina silt loam, 0 to 2 percent slopes	6,546	2.5
CeB	Celina silt loam, 2 to 6 percent slopes	5,569	2.2
ChA	Celina-Strawn complex, 0 to 2 percent slopes	2,518	1.0
ChB	Celina-Strawn complex, 2 to 6 percent slopes	4,553	1.8
CrA	Crosby silt loam, 0 to 2 percent slopes	20,979	8.2
CrB	Crosby silt loam, 2 to 6 percent slopes	632	0.2
DoE	Donnelsville channery silt loam, 18 to 30 percent slopes	239	*
DpF	Donnelsville-Rock outcrop complex, 30 to 70 percent slopes	280	0.1
Dr	Drummer silty clay loam, gravelly substratum	3,733	1.5
EmA	Eldean silt loam, 0 to 2 percent slopes	9,310	3.6
EmB	Eldean silt loam, 2 to 6 percent slopes	5,442	2.1
EmB2	Eldean silt loam, 2 to 6 percent slopes, eroded	1,517	0.6
EmC2	Eldean silt loam, 6 to 12 percent slopes, eroded	778	0.3
EnC2	Eldean-Casco complex, 6 to 12 percent slopes, eroded	311	0.1
EpB2	Eldean-Miamian complex, 2 to 6 percent slopes, eroded	3,305	1.3
EpC2	Eldean-Miamian complex, 6 to 12 percent slopes, eroded	6,206	2.4
EpC3	Eldean-Miamian complex, 6 to 12 percent slopes, severely eroded	1,236	0.5
EpD2	Eldean-Miamian complex, 12 to 18 percent slopes, eroded	3,355	1.3
EpD3	Eldean-Miamian complex, 12 to 18 percent slopes, severely eroded	550	0.2
EpE2	Eldean-Miamian complex, 18 to 30 percent slopes, eroded	580	0.2
EsE3	Eldean-Rodman complex, 18 to 30 percent slopes, severely eroded	212	*
EuB	Eldean-Urban land complex, 2 to 6 percent slopes	1,655	0.6
EuC	Eldean-Urban land complex, 6 to 12 percent slopes	697	0.3
Ge	Genesee silt loam, till substratum, rarely flooded	246	*
Gn	Genesee silt loam, till substratum, occasionally flooded	1,637	0.6
Ko	Kokomo silty clay loam	37,430	14.6
Lg	Linwood muck, undrained	166	*
Lh	Linwood mucky silt loam, drained	809	0.3
Lm	Lippincott mucky silt loam	616	0.2
Lp	Lippincott silty clay loam	8,655	3.4
Lu	Lippincott-Urban land complex	237	*
MgB2	Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded	496	0.2
MgC2	Miamian silty clay loam, limestone substratum, 6 to 12 percent slopes, eroded	102	*
MgE2	Miamian silty clay loam, limestone substratum, 18 to 30 percent slopes, eroded	190	*
MhA	Miamian silt loam, 0 to 2 percent slopes	3,888	1.5
MhB	Miamian silt loam, 2 to 6 percent slopes	20,418	7.9
MhB2	Miamian silt loam, 2 to 6 percent slopes, eroded	5,122	2.0
MhC	Miamian silt loam, 6 to 12 percent slopes	1,406	0.5
MhC2	Miamian silt loam, 6 to 12 percent slopes, eroded	949	0.4
MhD2	Miamian silt loam, 12 to 18 percent slopes, eroded	394	0.2
MhE	Miamian silt loam, 18 to 30 percent slopes	773	0.3
MhE2	Miamian silt loam, 18 to 30 percent slopes, eroded	683	0.3
MkB2	Miamian silty clay loam, 2 to 6 percent slopes, eroded	7,892	3.1
MkC2	Miamian silty clay loam, 6 to 12 percent slopes, eroded	5,201	2.0
MkD2	Miamian silty clay loam, 12 to 18 percent slopes, eroded	1,230	0.5
MmC3	Miamian clay loam, 6 to 12 percent slopes, severely eroded	2,719	1.1
MmD3	Miamian clay loam, 12 to 18 percent slopes, severely eroded	871	0.3
MmE3	Miamian clay loam, 18 to 30 percent slopes, severely eroded	663	0.3
MnB	Miamian-Urban land complex, 2 to 6 percent slopes	2,635	1.0
MnC	Miamian-Urban land complex, 6 to 12 percent slopes	245	*
Mo	Milford silty clay loam, sandy substratum	2,293	0.9
Ms	Millsdale silty clay loam	1,215	0.5
MtA	Milton silt loam, 0 to 2 percent slopes	463	0.2
MtB	Milton silt loam, 2 to 6 percent slopes	877	0.3
MvC2	Milton silty clay loam, 6 to 12 percent slopes, eroded	500	0.2
MxB	Milton-Urban land complex, 2 to 6 percent slopes	469	0.2
OcA	Ockley silt loam, 0 to 2 percent slopes	5,044	2.0

See footnote at end of table.

Table 5.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
OcB	Ockley silt loam, 2 to 6 percent slopes	641	0.2
Pa	Patton silty clay loam	530	0.2
Pg	Pits, gravel	530	0.2
Ph	Pits, quarry	182	*
RaA	Randolph silt loam, 0 to 2 percent slopes	350	0.1
RgE	Rodman gravelly loam, 18 to 35 percent slopes	1,845	0.7
Rn	Ross silt loam, occasionally flooded	2,385	0.9
Ro	Ross silty clay loam, rarely flooded	690	0.3
RuA	Rush silt loam, 0 to 2 percent slopes	1,756	0.7
ScA	Savona silt loam, 0 to 2 percent slopes	844	0.3
So	Sloan silt loam, sandy substratum, occasionally flooded	5,676	2.2
StB2	Strawn silty clay loam, 2 to 6 percent slopes, eroded	9,246	3.6
StC2	Strawn silty clay loam, 6 to 12 percent slopes, eroded	5,650	2.2
StD2	Strawn silty clay loam, 12 to 18 percent slopes, eroded	1,408	0.5
StE2	Strawn silty clay loam, 18 to 35 percent slopes, eroded	37	*
SuA	Strawn-Crosby complex, 0 to 2 percent slopes	2,355	0.9
SuB	Strawn-Crosby complex, 2 to 6 percent slopes	1,421	0.6
ThA	Thackery silt loam, 0 to 2 percent slopes	1,259	0.5
Tr	Tremont silty clay loam, rarely flooded	1,398	0.5
Ts	Tremont silt loam, occasionally flooded	2,684	1.0
Ud	Udorthents, loamy	1,443	0.6
Ur	Urban land	1,176	0.5
W	Water	3,595	1.4
Wc	Wallkill silt loam, occasionally flooded	258	0.1
WeA	Warsaw silt loam, 0 to 3 percent slopes	1,168	0.5
WpA	Waupecan silt loam, 0 to 2 percent slopes	1,226	0.5
WrA	Waynetown silt loam, 0 to 2 percent slopes	989	0.4
Wt	Westland silty clay loam	7,186	2.8
	Total	256,883	100.0

* Less than 0.05 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.9 percent of the survey area.

NRCS Accessibility Statement

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United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Ohio Department of Natural Resources, Division of Soil and Water Conservation; Ohio Agricultural Research and Development Center; Ohio State University Extension; Clark Soil and Water Conservation District; and Clark County Commissioners

Soil Survey of Clark County, Ohio

Part II

How to Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

The **detailed soil maps** can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet, and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** in Part I of this survey, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** in Part II shows which table has data on a specific land use for each detailed soil map unit. See the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

A *State Soil Geographic Data Base (STATSGO)* is available for the county. This data base consists of a soil map at a scale of 1:250,000 and descriptions of groups of associated soils. It replaces the general soil map published in older soil surveys. The map and the data base can be used for multicounty planning, and map output can be tailored for a specific use. More information about the State Soil Geographic Data Base for this county, or for any part of Ohio, is available at the local office of the Natural Resources Conservation Service.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Natural Resources Conservation Service, the Ohio Department of Natural Resources, Division of Soil and Water Conservation, the Ohio Agricultural Research and Development Center, and the Ohio State University Extension. It is part of the technical assistance furnished to the Clark Soil and Water Conservation District. The survey was materially aided by funds provided by the Clark County Commissioners.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: A farmstead in an area of Miamian silt loam, 2 to 6 percent slopes.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 1999

Detailed Soil Map Unit Legend

Ad—Adrian muck, drained
Ae—Adrian muck, undrained
Ca—Carlisle muck, drained
Cb—Carlisle muck, undrained
CcD2—Casco gravelly loam, 12 to 20 percent slopes, eroded
CeA—Celina silt loam, 0 to 2 percent slopes
CeB—Celina silt loam, 2 to 6 percent slopes
ChA—Celina-Strawn complex, 0 to 2 percent slopes
ChB—Celina-Strawn complex, 2 to 6 percent slopes
CrA—Crosby silt loam, 0 to 2 percent slopes
CrB—Crosby silt loam, 2 to 6 percent slopes
DoE—Donnelsville channery silt loam, 18 to 30 percent slopes
DpF—Donnelsville-Rock outcrop complex, 30 to 70 percent slopes
Dr—Drummer silty clay loam, gravelly substratum
EmA—Eldean silt loam, 0 to 2 percent slopes
EmB—Eldean silt loam, 2 to 6 percent slopes
EmB2—Eldean silt loam, 2 to 6 percent slopes,eroded
EmC2—Eldean silt loam, 6 to 12 percent slopes, eroded
EnC2—Eldean-Casco complex, 6 to 12 percent slopes, eroded
EpB2—Eldean-Miamian complex, 2 to 6 percent slopes, eroded
EpC2—Eldean-Miamian complex, 6 to 12 percent slopes, eroded
EpC3—Eldean-Miamian complex, 6 to 12 percent slopes, severely eroded
EpD2—Eldean-Miamian complex, 12 to 18 percent slopes, eroded
EpD3—Eldean-Miamian complex, 12 to 18 percent slopes, severely eroded
EpE2—Eldean-Miamian complex, 18 to 30 percent slopes, eroded
EsE3—Eldean-Rodman complex, 18 to 30 percent slopes, severely eroded
EuB—Eldean-Urban land complex, 2 to 6 percent slopes
EuC—Eldean-Urban land complex, 6 to 12 percent slopes
Ge—Genesee silt loam, till substratum, rarely flooded
Gn—Genesee silt loam, till substratum, occasionally flooded
Ko—Kokomo silty clay loam
Lg—Linwood muck, undrained
Lh—Linwood mucky silt loam, drained
Lm—Lippincott mucky silt loam
Lp—Lippincott silty clay loam
Lu—Lippincott-Urban land complex
MgB2—Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded
MgC2—Miamian silty clay loam, limestone substratum, 6 to 12 percent slopes, eroded
MgE2—Miamian silty clay loam, limestone substratum, 18 to 30 percent slopes, eroded
MhA—Miamian silt loam, 0 to 2 percent slopes
MhB—Miamian silt loam, 2 to 6 percent slopes
MhB2—Miamian silt loam, 2 to 6 percent slopes, eroded
MhC—Miamian silt loam, 6 to 12 percent slopes
MhC2—Miamian silt loam, 6 to 12 percent slopes, eroded
MhD2—Miamian silt loam, 12 to 18 percent slopes, eroded
MhE—Miamian silt loam, 18 to 30 percent slopes
MhE2—Miamian silt loam, 18 to 30 percent slopes, eroded
MkB2—Miamian silty clay loam, 2 to 6 percent slopes, eroded
MkC2—Miamian silty clay loam, 6 to 12 percent slopes, eroded
MkD2—Miamian silty clay loam, 12 to 18 percent slopes, eroded
MmC3—Miamian clay loam, 6 to 12 percent slopes, severely eroded
MmD3—Miamian clay loam, 12 to 18 percent slopes, severely eroded
MmE3—Miamian clay loam, 18 to 30 percent slopes, severely eroded
MnB—Miamian-Urban land complex, 2 to 6 percent slopes
MnC—Miamian-Urban land complex, 6 to 12 percent slopes
Mo—Milford silty clay loam, sandy substratum
Ms—Millsdale silty clay loam
MtA—Milton silt loam, 0 to 2 percent slopes
MtB—Milton silt loam, 2 to 6 percent slopes

MvC2—Milton silty clay loam, 6 to 12 percent slopes, eroded
MxB—Milton-Urban land complex, 2 to 6 percent slopes
OcA—Ockley silt loam, 0 to 2 percent slopes
OcB—Ockley silt loam, 2 to 6 percent slopes
Pa—Patton silty clay loam
Pg—Pits, gravel
Ph—Pits, quarry
RaA—Randolph silt loam, 0 to 2 percent slopes
RgE—Rodman gravelly loam, 18 to 35 percent slopes
Rn—Ross silt loam, occasionally flooded
Ro—Ross silty clay loam, rarely flooded
RuA—Rush silt loam, 0 to 2 percent slopes
ScA—Savona silt loam, 0 to 2 percent slopes
So—Sloan silt loam, sandy substratum, occasionally flooded
StB2—Strawn silty clay loam, 2 to 6 percent slopes, eroded
StC2—Strawn silty clay loam, 6 to 12 percent slopes, eroded
StD2—Strawn silty clay loam, 12 to 18 percent slopes, eroded
StE2—Strawn silty clay loam, 18 to 35 percent slopes, eroded
SuA—Strawn-Crosby complex, 0 to 2 percent slopes
SuB—Strawn-Crosby complex, 2 to 6 percent slopes
ThA—Thackery silt loam, 0 to 2 percent slopes
Tr—Tremont silty clay loam, rarely flooded
Ts—Tremont silt loam, occasionally flooded
Ud—Udorthents, loamy
Ur—Urban land
Wc—Wallkill silt loam, occasionally flooded
WeA—Warsaw silt loam, 0 to 3 percent slopes
WpA—Waupecan silt loam, 0 to 2 percent slopes
WrA—Waynetown silt loam, 0 to 2 percent slopes
Wt—Westland silty clay loam

Foreword

This soil survey contains information that can be used in land-planning programs in Clark County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Patrick K. Wolf
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Clark County, Ohio

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Table 1 shows the classification of the soils in this survey area. Table 2 shows the extent of the soils in the survey area.

Agronomy

More than 180,000 acres, or about 72 percent of the cropland in the county, was used as cropland and pastureland in 1982, according to the Clark Soil and Water Conservation District Resources Inventory. Of this total, nearly 17,400 acres, or about 6.9 percent, was used as pastureland.

The soils in Clark County vary widely in their suitability for specific crops, and they require widely different management. Certain basic management practices, however, such as maintaining an adequate level of soil fertility, improving existing drainage, controlling erosion, and maintaining or improving soil tilth, are needed on nearly all of the soils in the county. Many of the soils in the county are suited to the crops commonly grown in the area and to some crops that are not commonly grown, such as barley, grain sorghum, popcorn, and sunflowers.

Deep and very deep soils that are characterized by good natural drainage and that warm early in the spring are especially well suited to many vegetables, small fruits, nursery plants, and orchards. These soils include the Eldean, Ockley, Rush, Warsaw, and Waupecan soils that have slopes of less than 6 percent and that are on terraces and outwash plains. These soils may also occur in low areas where air drainage is poor and frost is earlier and more frequent. These areas generally are poorly suited to some early vegetables, small fruits, and orchard crops.

The latest information and suggestions for growing specialty crops can be obtained from local offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

The potential for increased crop production in Clark County is good. The acreage farmed and the yields per acre could both be increased. Food production can also be increased by applying the latest crop production technology to the existing cropland in the county. This soil survey can greatly facilitate the application of such technology. In addition to the land currently being cropped, some land that is idle land, woodland, or unimproved pasture could be used as productive cropland, but the cost of converting this land to cropland and the impact of these conversions on the environment should be considered. Also, the 1985 Food Security Act places certain restrictions on bringing wetlands and highly erodible fields into production for those who participate in Federal farm programs.

Some of the cropland and pastureland in Clark County has been used for urban development. About 11 percent of the county is urban land (USDA, 1971). The acreage used for crops and pasture has been affected by the use of land for urban development or other uses.

Soil drainage is a major management concern on more than 104,000 acres of land in Clark County. This acreage does not include miscellaneous areas or urban land. Also, erosion is a hazard where slopes are more than 2 percent. Celina and Crosby soils that have slopes of more than 2 percent are subject to wetness and to erosion.

Soil erosion is damaging for two reasons. First, the productivity of the soil is reduced. Second, the water in streams and lakes can become polluted. Erosion of the surface layer is especially damaging on soils that have a clayey subsoil. Celina, Crosby, Eldean, Miamian, and Milton soils are examples. As the surface layer is removed, part of the clayey subsoil is incorporated into the plow layer. The higher clay content in the surface layer reduces soil tilth, resulting in a poorer seedbed. More energy is then required to till the soils, and more fertilizer is needed to replace lost plant nutrients. Soil erosion is also damaging to soils that are moderately deep, such as Milton soils, because it further reduces the root zone. Erosion reduces productivity on soils that tend to be droughty, such as Eldean, Milton, and Rodman soils. The surface layer stores the largest amount of water. Erosion reduces the available water capacity in the surface layer.

Erosion degrades water quality by increasing the amount of sediment in streams. By volume, sediment is the largest pollutant of streams in Clark County. Sediment indirectly degrades water quality because of the organic matter, plant nutrients, herbicides, and insecticides it carries from eroding fields. Controlling erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal and recreational uses and for fish and other wildlife.

Practices that control erosion provide a protective cover of vegetation, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that keeps plant cover on the soil for extended periods reduces the hazard of erosion. Including forage crops of legumes and grasses in the rotation reduces the hazard of erosion, provides nitrogen, and improves tilth. Because the gently sloping Eldean, Miamian, and Strawn soils have short, irregular slopes, erosion is a severe hazard if these soils are farmed using conventional methods. A system of conservation tillage leaves crop residue on the surface, increases the rate of water infiltration, and helps to control runoff and erosion. Contour farming and terraces generally are not practical on these soils because of the short, irregular slopes. Celina, Eldean, Miamian, Milton, Ockley, Rush, Thackery, Warsaw, and Waupecan soils and some alluvial soils are well suited to no-till planting. Eroded phases of Casco, Eldean, Miamian, and Strawn soils are suited to no-till. Crosby, Randolph, Savona, and Waynetown soils are suited to no-till planting if they are adequately drained.

Grassed waterways are natural or constructed outlets protected by grass cover (fig. 1). Natural drainageways are the best locations for waterways because they typically require a minimum of shaping. Effective waterways are constructed with sufficient capacity to handle surface flow but should still be crossable with farm machinery.

Soil blowing is a hazard on soils that have a mucky surface layer, for example, Adrian, Carlisle, and Linwood soils. These soils are subject to damage if winds are strong and the soils are level and dry and bare of vegetation or mulch. Maintaining a surface cover of mulch or keeping the surface ridged or rough through proper tillage minimizes soil loss by wind. Field windbreaks of suitable shrubs or trees are also effective in reducing the hazard of soil blowing.

Information on the design of erosion-control practices for each kind of soil is available at the local office of the Clark Soil and Water Conservation District.

Soil wetness is a major management concern in Clark County. Subsurface and surface drains are used to remove excess water and thus allow tilling and planting early in the spring. Short-season or early maturing crop varieties can be harvested earlier. Subsurface drains lower the seasonal high water table and thus increase the depth to which plant roots can penetrate. Some of the soils commonly have a seasonal high water table near or above the surface. Natural drainage outlets are generally not available because of the position of the soils on the landscape. If a drainage system has not been provided, these soils are usually too wet for the production of most of the commonly grown crops. The very poorly drained Adrian, Carlisle, Drummer, Kokomo, Linwood, Lippincott, Milford, Millsdale, Patton, Sloan, Wallkill, and Westland soils have a seasonal high water table near or above the surface during part of the year.

Somewhat poorly drained soils, such as Crosby, Randolph, Savona, and Waynetown soils, have a water table in the upper part of the subsoil in winter and spring. Subsurface drainage is needed for most crops. Even if they are drained, these soils generally stay wet longer than the associated very poorly drained soils. Crop growth and yields are generally limited if the soils are not drained. Planting and harvesting are usually delayed.

Celina, Thackery, and Tremont soils are moderately well drained. These soils commonly include areas of wetter soils in seeps and swales and along drainageways. Surface and subsurface drains are effective in these wetter areas.

The design of both surface and subsurface drainage systems varies, depending on the type of soil and the availability of adequate outlets. A combination of surface drainage and subsurface drainage is needed in most areas of very poorly drained and somewhat poorly drained soils that are intensively row cropped. The drains in soils that have slow or very slow permeability should be spaced more closely than those in soils that are more permeable. Subsurface drainage is slow or very slow in Crosby and Milford soils. Open ditches commonly are used to remove surface water and serve as outlets for subsurface drains (fig. 2).

Organic soils oxidize and subside when the pore space is filled with air. Special drainage systems are needed in areas of these soils to control the depth and period of drainage. Lowering the water table during the cropping season to a level that permits good aeration of the root zone but still supplies the water needed by the plants and raising it to the surface during other times of the year can minimize the oxidation and subsidence of these wet soils.

Maintaining a drainage system is more economical than replacing the system. Seeding ditchbanks and berms helps to control streambank erosion and minimizes the slumping of banks. Filter strips seeded to a width of 10 feet or more also minimize the equipment limitations. Removing brush helps to prevent floodwater rising above the level of outlets for subsurface drains. Animal guards prevent animals from damaging subsurface drains and blocking the flow of water. Replacing broken drains keeps silt from accumulating on the bottom of the drains. Providing protection for banks underneath the drain outlets helps

Figure 1.—A grassed waterway constructed in a natural drainageway in an area of Lippincott silty clay loam.

to prevent erosion. Material used for bank protection can include rock, broken tile fragments, or grass.

Soil fertility is naturally relatively low in some of the sandy soils and in the eroded, more sloping soils. In addition, sandy soils retain only a small amount of plant nutrients; therefore, more frequent additions of fertilizers are needed. Soils that commonly are naturally more acid are Celina, Crosby, Ockley, Rush, Savona, Warsaw, Waupecan, and Waynetown soils. The more acid subsoil limits the availability of some plant nutrients. The content of organic matter is moderately low or low in Casco, Strawn, and Rodman soils and in nearly all of the eroded soils. The soils on flood plains, such as Genesee, Ross, Sloan, and Tremont soils, naturally have a higher content of plant nutrients than most of the upland soils. The content of organic matter is moderate or high in the soils on flood plains. The surface layer of many very poorly drained soils is very dark grayish brown or black. The content of organic matter is high or very high in these soils. Special fertilizer may be needed on some soils because of micronutrient deficiencies. Deficiencies may occur in soils that are sandy, have a low content of organic matter, or have a pH of less than 5.5 or more than 7.3. They may also occur in soils that have a surface layer of muck.

The effectiveness of nitrogen applied in the fall in areas of very poorly drained and somewhat poorly drained soils is reduced by leaching and denitrification. Incorporating fertilizer into the soil in gently sloping and sloping areas reduces the amount of soil lost through erosion. Applications of lime are necessary to raise the reaction of the surface layer to a level where most plant nutrients are readily available. On all of the soils, a balanced fertility program that includes adding lime and fertilizer should be based on the results of soil tests and plant analysis. Soil limitations other than fertility should be considered. The Cooperative Extension Service and private soil laboratories can help in determining the kinds and amounts of fertilizer to be applied.

Soil tilth is an important factor in the germination of

Figure 2.—Surface and subsurface drainage in a nearly level area of Kokomo silty clay loam.

seeds and in the infiltration of water into the soils. Soils that have good tilth are friable and porous. They can be worked easily, provide good seed contact, and allow for quick seedling emergence and strong root growth.

Many of the soils on uplands that are used as cropland have a surface layer of silt loam that has a moderate or moderately low content of organic matter. The surface of these soils generally crusts when it dries after a heavy rainfall. The crust is hard, is slow to absorb water, and fractures very little. It reduces the infiltration rate, retards seedling emergence, and increases the runoff rate. Regularly adding crop residue, manure, and other organic materials to the soil maintains or improves soil structure and minimizes crusting. Using minimum tillage or mulch tillage or incorporating crop residue into the surface layer also helps to prevent crusting. Allowing part of the residue to be exposed above the surface provides pathways for the movement of air and water.

Fall moldboard plowing is generally not the best practice on soils that have a surface layer of light

colored silt loam because the surface crusts in winter and spring. Many of these soils are nearly as dense and hard after fall moldboard plowing as they were before plowing. Moreover, soils that have slopes of more than 2 percent are more subject to erosion if they are moldboard plowed in the fall. A rough, irregular surface that leaves residue partially covered absorbs more water and dries faster than a smoothly tilled surface.

Some dark soils have a surface layer that contains more clay than that of most other soils in the county. Poor tilth is a problem because these soils tend to stay wet until late in spring. These soils can be tilled within only a narrow range in moisture content. If they are tilled when wet, the soils tend to be very cloddy and hard when dry. The cloddiness makes the preparation of a good seedbed difficult. Fall plowing allows winter freezing and drying to break up clods. Using mulch tillage and returning crop residue to the soil help to prevent crusting. These clayey soils generally crack when they dry. The cracks increase the rate of water infiltration (fig. 3).

Surface compaction occurs if the soils are tilled or harvested when wet or if they are subject to heavy traffic or heavy loads. Compaction can be prevented by tilling the soils at the proper soil moisture conditions, using minimum tillage, and planting deep-rooted legumes and grasses. Also, using four-wheel-drive tractors with flotation tires helps to minimize compaction. Surface compaction limits root growth, reduces water movement, and creates plowpans.

Irrigation is not used to a great extent in Clark County. Generally, rainfall is ample for crop moisture requirements. However, rainfall is commonly not timely or well distributed. During dry periods, supplemental irrigation could increase yields. Some of the soils in the county are suited to irrigation and can be irrigated if water is available. Eldean, Milton, Ockley, and Rush soils are especially well suited to irrigation.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn and soybeans are the main row crops. Grain sorghum, sugar beets, sunflowers, navy beans, and similar crops can be grown. Economic conditions generally determine whether these crops are grown.

Wheat, rye, and oats are the most common close-growing crops. Alfalfa and grass-legume hay are also grown. The soils and climate are suited to barley, buckwheat, and flax and grass seed produced from bromegrass, fescue, timothy, and bluegrass.

Specialty crops grown commercially in the survey area are mainly apples, popcorn, potatoes, carrots, strawberries, and sweet corn. The acreage of such crops could be increased if economic conditions were favorable.

Eldean, Ockley, and Rush soils and soils that have slopes of less than 6 percent, have good natural drainage, and warm early in spring are especially well suited to vegetables and fruits. Crops can generally be planted and harvested earlier on these soils than on the other soils in the county.

Pasture and hayland make up about 7 percent of the acreage in Clark County (USDA, 1971). Most of the soils used as pasture and hayland are on hillsides adjacent to cultivated areas in the less sloping areas. Some of the pasture and hayland is in irregularly shaped areas of occasionally flooded soils. A few woodlots are also pastured, but woodlots generally provide grazing of poor quality because forage plants are sparse.

Most of the soils in the county are suited to the production of high-quality permanent pasture, although yields vary widely. The pasture and hayland generally support bluegrass and tall grasses, such as tall fescue, orchardgrass, and timothy. Some pastures are unimproved and require renovation and brush control.

The Genesee, Sloan, Tremont, and Ross soils on flood plains are potentially well suited to use as permanent pasture. Occasional flooding during the growing season is less damaging to pasture than to grain crops. These alluvial soils are fertile and have a high available water capacity, and potential pasture yields are high. Surface drains and subsurface drains are used to remove excess water on the very poorly drained Sloan soils, particularly if legumes are grown. Artificial drainage is generally not used on the better drained Genesee, Ross, and Tremont soils.

Soils in sloping to moderately steep areas are commonly eroded, are low in fertility, and have insufficient water available for plants because runoff is rapid. Forage production on these soils is low. Growth is good in the gently sloping areas of the same soils.

Overgrazing results in fields of weedy, low-producing forage and increases the hazard of erosion because of the sparse, short vegetative cover. Good management can restore the productivity of the pasture.

Surface compaction is caused by overgrazing or grazing when the soils are wet. It can greatly reduce the vigor of pasture plants. Also, it can increase the runoff rate and the hazard of erosion on sloping soils. Deferring grazing during wet periods minimizes compaction.

The successful establishment of forage crops requires the selection of species and varieties that are

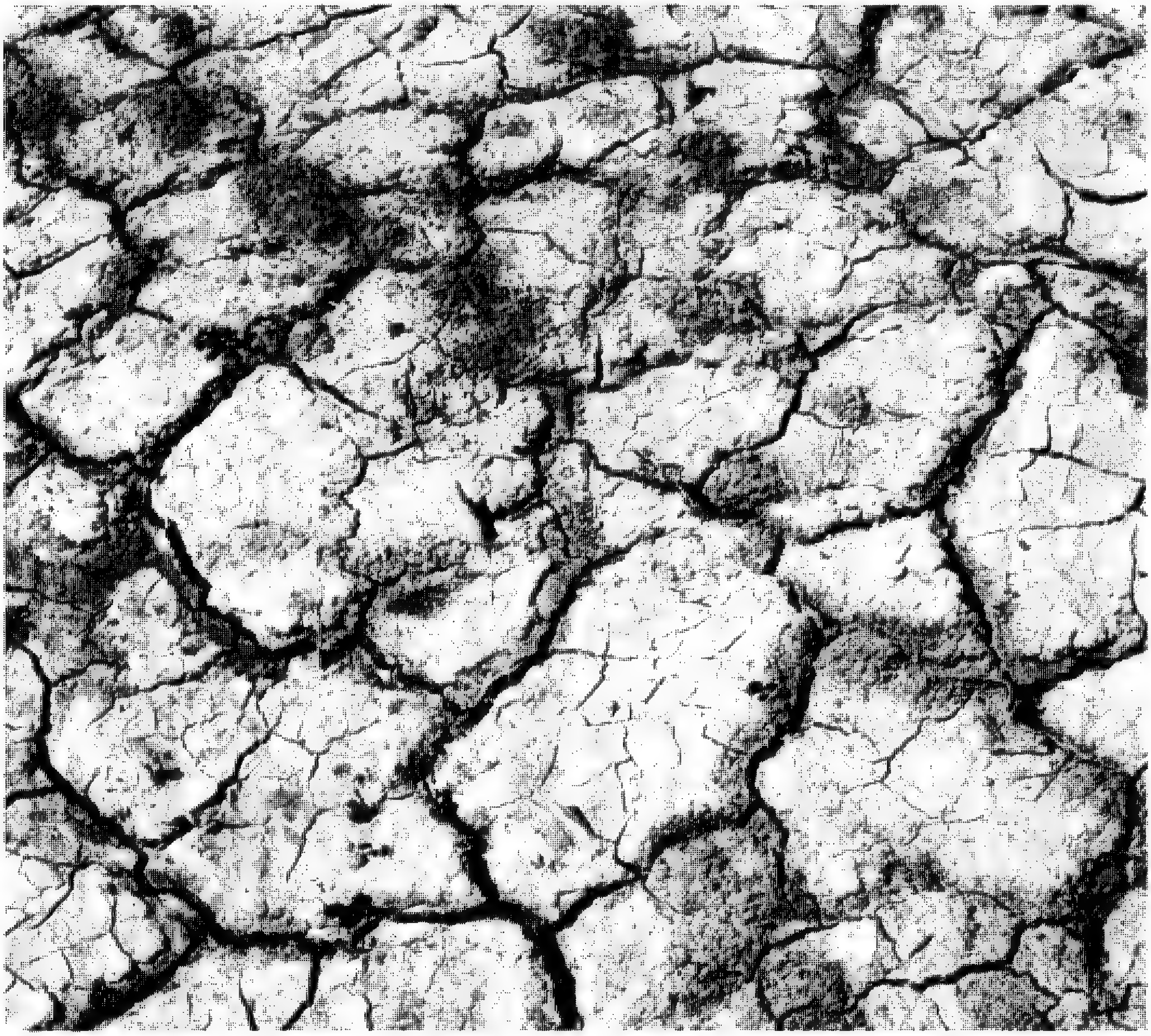

Figure 3.—Shrinkage causes cracks in the drying surface layer of Millsdale silty clay loam.

adapted to the soils. If the pasture is reseeded, proper seedbed preparation, proper seeding methods and seeding times, and proper applications of lime and fertilizer are needed. Forage renovation involves removing the existing grasses and weeds before the pasture is reseeded to the desired species. Removing the existing sod and leaving it on or near the surface as mulch help to control erosion. Nearly level pastures can be plowed. In gently sloping and strongly sloping areas, the pasture should be tilled and seeded on the contour.

No-till seeding is effective on most of the soils in Clark County, except for the wetter soils. Before this seeding method is applied, vegetation should be removed by grazing or by herbicide applications.

April and August are generally the best times for forage seeding. The forage can be seeded with a small grain crop. Because of plant competition for light, moisture, and nutrients, however, this method of seeding results in lower quality forage stands.

The selection of mixtures for seeding should be based on soil characteristics and on the desired pasture management system. Mixtures of grasses and legumes have a higher nutrient value than grass alone.

Legumes also provide nitrogen for improved grass growth. Alfalfa and red clover should be seeded on well drained soils. Ladino clover and alsike clover grow best on the wetter soils. Birdsfoot trefoil, bromegrass, lespedeza, warm-season grasses, and vetches are generally not grown as forage crops in Clark County, but they could be successfully included in a forage management system.

Applying lime and fertilizer according to the results of soil tests ensures good productivity and lengthens the life of the stand. Controlling weeds by mowing, clipping, and spraying is important for continued high production. Timely mowing is needed. Control of insects, such as alfalfa weevil and potato leafhopper, may be needed.

Harvesting hay or silage and grazing forage species at the proper stage of maturity are important for deriving the maximum nutritional value. The most current agronomy guide indicates the proper management of the forage species on a given farm.

Permanent pasture has fertility requirements similar to those of cropland. Lime and fertilizer should be applied at rates indicated by soil tests. The control of weeds by periodic mowing and by using recommended herbicides encourages the growth of desirable pasture plants. Controlled grazing helps to maintain pasture plants. The latest information on seeding mixtures, herbicide treatment, and other management for specific soils can be obtained from the local offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed soil map units in the survey area for crops are shown in table 3. The main concerns affecting the management of nonirrigated cropland are controlling soil blowing and water erosion, removing excess water, minimizing surface crusting and compaction, conserving moisture, and maintaining soil tilth, organic matter content, and fertility.

Generally, a combination of several practices is needed to control soil blowing and water erosion. Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Surface or subsurface drainage or both are used to remove excess water, lower the seasonal high water table, and minimize ponding.

A surface crust forms in tilled areas after hard rains and may inhibit seedling emergence. Regular additions of crop residue, manure, or other organic materials improve soil structure and minimize crusting.

Tilling within the proper range in moisture content minimizes surface compaction.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the rate of water infiltration. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Measures that are effective in maintaining soil tilth, organic matter content, and fertility include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *flooding, depth to rock, ponding, slope,* and *limited organic matter content.*

Flooding.—Flooding can damage winter grain and forage crops. A tillage method that partly covers crop residue and leaves a rough or ridged surface helps to prevent removal of crop residue by floodwater. Tilling and planting should be delayed in the spring until flooding is no longer a hazard.

Depth to rock.—Rooting depth and available moisture may be limited by rock within a depth of 40 inches.

Ponding.—Surface drains help to remove excess surface water and minimize damage from ponding.

Slope.—Where the slope is more than 15 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied. The selection of crops and the use of equipment are limited. Cultivation may be restricted.

Limited organic matter content.—Many soils that have a light colored surface layer have a low or moderately low organic matter content and weak or moderate structure. Regularly adding crop residue, manure, and other organic material to the soil maintains or improves the content of organic matter and soil structure.

Additional limitations and hazards are as follows:

Areas of rock outcrop and slick spots.—Farming around these areas may be feasible. Subsoiling or deep ripping soft sedimentary beds increases the effective rooting depth and the rate of water infiltration.

Excessive permeability.—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor. Crops generally respond better to smaller, more frequent applications of fertilizer and lime than to one large application.

Potential for ground-water pollution.—This is a hazard in soils that have excessive permeability, hard bedrock, or a water table within the profile.

Lime content, limited available water capacity, poor tilth, restricted permeability, and *surface crusting.*—These limitations can be overcome by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer in areas of soils that have a high content of lime.

Short frost-free season.—If the growing season is less than 90 days, short-season crops or grasses should be grown.

Frost heave.—Frost heaving can damage deep-rooted legumes and some small grain crops.

Surface rock fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Surface stones.—Stones or boulders on the surface can hinder normal tillage unless they are removed.

Subsidence of organic matter.—Subsidence or shrinking occurs as a result of oxidation in the organic material after the soil is drained. Control of the water table by subirrigation through subsurface drain lines reduces the hazards of subsidence, burning, and soil blowing.

Salt and sodium content.—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

On irrigated soils the main management concerns are efficient water use, nutrient management, control of erosion, pest and weed control, and timely planting and harvesting for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can create drainage problems, raise the water table, and increase soil salinity.

The following is an explanation of the criteria used to determine the limitations or hazards.

Areas of rock outcrop.—Rock outcrop is a named component of the map unit.

Areas of rubble land.—Rubble land is a named component of the map unit.

Areas of slick spots.—Slick spots are a named component of the map unit.

Depth to rock.—Bedrock is within a depth of 40 inches.

Easily eroded.—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Excessive permeability.—The upper limit of the permeability range is 6 inches or more within the soil profile.

Occasional flooding.—The component of the map unit is occasionally flooded.

Rare flooding.—The component of the map unit is subject to rare flooding.

Lime content.—The component is assigned to wind erodibility group 4L or has more than 5 percent lime in the upper 10 inches.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

Ponding.—Ponding duration is assigned to the component of the map unit.

Potential for ground-water pollution.—The soil has an apparent water table within a depth of 4 feet or hard bedrock within the profile, or permeability is more than 6 inches per hour within the profile.

Poor tilth.—The component of the map unit is severely eroded, has less than 1 percent organic matter in the surface layer, or has more than 35 percent clay in the surface layer.

Fair tilth.—The component of the map unit has a surface layer of silty clay loam or gravelly loam.

Restricted permeability.—Permeability is 0.06 inch per hour or less within the profile.

Seasonal high water table.—The lower water table depth is less than 1.5 feet.

Salt content.—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

Short frost-free season.—The map unit has a growing season of less than 90 frost-free days.

Slope.—The upper slope range of the component of the map unit is more than 15 percent.

Sodium content.—The sodium adsorption ratio of the component of the map unit is more than 13 within a depth of 30 inches.

Soil blowing.—The wind erodibility index multiplied by the selected high C factor for the survey area and then divided by the T factor is more than 8 for the component of the map unit.

Surface rock fragments.—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery, and "surface stones" is not already indicated as a limitation.

Surface crusting.—The organic matter content of

the surface layer is less than or equal to 3 percent and the texture is silt loam, loam, or silty clay loam.

Surface stones.—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the soil is a stony or bouldery phase.

Surface compaction.—The component of the map unit has a surface layer of silt loam, silty clay loam, silty clay, or clay loam.

Frost heave.—The component of the map unit has a high potential for frost action.

Part of surface removed.—The surface layer of the component of the map unit is eroded.

Most of surface removed.—The surface layer of the component of the map unit is severely eroded.

Limited organic matter.—The content of organic matter in the surface layer of the component of the map unit is less than or equal to 3 percent.

Subsidence of organic matter.—The organic matter content of the surface layer of the component of the map unit is greater than or equal to 20 percent.

Crop Yield Estimates

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops

Pasture and Hayland Interpretations

Soils are assigned to pasture and hayland groups according to their suitability for the production of forage. The soils in each group are similar enough to be suited to the same species of grasses or legumes, have similar limitations and hazards, require similar management, and have similar productivity levels and other responses to management.

Under good management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

Yield estimates are often provided in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

In the section "Interpretive Groups," the pasture and hayland suitability group symbol is listed for each soil. Soils assigned the same suitability group symbol require the same general management and have about the same potential productivity. The pasture and hayland suitability groups are based on soil characteristics and limitations.

Soils assigned to Group A have few limitations for the management and growth of climatically adapted plants. Those assigned to group A-1 are deep or very deep and are well drained. They have a surface layer of silt loam, silty clay loam, clay loam, or gravelly clay loam. The available water capacity ranges from low to high. These soils respond favorably to additions of lime. Frequent applications may be needed to maintain an adequate pH level. A low pH in the subsoil can shorten the life of some deep-rooted legumes in the stand. Slopes range from 0 to 18 percent.

Soils in group A-2 are deep or very deep and are well drained. They have a surface layer of silt loam, silty clay loam, or clay loam. The available water capacity is low or moderate. These soils respond favorably to additions of lime. Frequent applications may be needed to maintain an adequate pH level. The low pH of the subsoil can shorten the life of some

deep-rooted legumes in a stand. Slopes range from 12 to 30 percent. The slope may interfere with the mechanical application of lime and fertilizer and with clipping, mowing, and spraying for weed control. If the soils are overgrazed or cultivated for reseeding, the slope increases the hazard of erosion. These soils are suited to no-till reseedings and interseedings.

Soils in group A-4 are deep or moderately deep and are well drained. They have stones or boulders on the surface that are extensive enough to preclude the use of hay-making equipment. The soils have a surface layer of channery silt loam. The available water capacity is low. Slopes range from 18 to 70 percent.

Soils in group A-5 are very deep and are well drained or moderately well drained. They are subject to rare or occasional flooding. The flooding limits the use of these soils for pasture during periods of stream overflow, and sediment lowers the quality of the forage. These soils have a surface layer of silt loam or silty clay loam. The available water capacity is high or very high. Slopes are 0 to 2 percent.

Soils in group A-6 are very deep and are well drained and moderately well drained. They are subject to frost action. Frost action can damage legume stands. Mixing fibrous-rooted grasses with legumes and using proper grazing management measures help to prevent the damage caused by frost action. These soils have a surface layer of silt loam or silty clay loam. The available water capacity is moderate or high. Slopes range from 0 to 18 percent.

Soils in group B have limited potential for growth and production because of droughtiness. Those in group B-1 are very deep and are somewhat excessively drained. They have a surface layer of gravelly loam. The available water capacity is low. The soils are sandy or sandy-skeletal in the subsoil. Slopes range from 12 to 20 percent.

Soils in group B-2 are very deep and are excessively drained. They have a surface layer of gravelly loam. Growth and production are limited because of the very low available water capacity. These soils have a gravelly subsoil. Slopes range from 18 to 35 percent.

Soils in group C are wet because of a seasonal high water table. Those in group C-1 are very deep and are somewhat poorly drained or very poorly drained. They have a surface layer of silt loam, silty clay loam, or mucky silt loam. The available water capacity ranges from moderate to very high. These soils normally respond well to subsurface drainage. Slopes range from 0 to 6 percent.

Soils in group C-2 are moderately deep and are somewhat poorly drained or very poorly drained. They have a surface layer of silty clay loam or silt loam. The available water capacity is low. A seasonal high water table limits the rooting depth of deep-rooted forage plants. The rooting depth is also restricted by bedrock. Shallow-rooted species should be selected for planting in areas of these soils. Subsurface drains are used to lower the seasonal high water table. The effectiveness of subsurface drainage is typically limited by the restricted permeability in the subsoil, the depth to bedrock, or the landscape position of the soil. Forage crops that do not have a taproot can grow well in these soils. Slopes range from 0 to 2 percent.

Soils in group C-3 are very deep and are very poorly drained. They are subject to occasional flooding. The flooding limits the use of these soils for pasture during periods of stream overflow, and sediment lowers the quality of the forage. The soils have a surface layer of silt loam. The available water capacity is high. Slopes range from 0 to 2 percent. Frost action may damage legumes. Including grasses in a seeding mixture and using proper grazing management methods help to prevent the damage caused by frost action. The seasonal high water table limits the rooting depth of forage plants. Shallow-rooted species grow best in areas of these soils. Subsurface drains are used to lower the seasonal high water table. The effectiveness of subsurface drainage is limited by the landscape position of the soils.

Soils in group D are organic soils. Those in group D-1 are very deep and are very poorly drained. They formed entirely or partially in organic material. The available water capacity is high or very high. Slope is 0 to 2 percent.

Soils in group F have a restricted root zone. The root growth of climatically adapted plants is limited to a depth of 20 to 40 inches. Forage crops that do not have a taproot should be selected for planting in areas of these soils. Soils in group F-1 are moderately deep and are well drained. They have a surface layer of silt loam. The available water capacity is low. These soils are droughty. Warm-season grasses, such as switchgrass, big bluestem, indiangrass, and Caucasian bluestem, can be grown. The soils respond favorably to additions of lime. Frequent applications may be needed to maintain an adequate pH level. The low pH in the subsoil of some soils can shorten the life of some deep-rooted legumes in a stand. Slopes range from 0 to 12 percent.

The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about forage yields other than those shown in table 4.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils generally are grouped at three levels—capability class, subclass, and unit (USDA, 1961). These categories indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grain, cotton, soybeans, hay, and field-grown vegetables. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use.

If properly managed, soils in classes I, II, III, and IV are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class I to class IV. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes V, VI, and VII are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class V to class VII. The local office of the Cooperative Extension Service or the Natural Resources Conservation Service can provide guidance on the use of these soils as cropland.

Areas in class VIII are generally not suitable for crops, pasture, or woodland without a level of management that is impractical. These areas may have potential for other uses, such as recreation and wildlife habitat.

Capability subclasses identify the dominant kind of limitation in the class. They are designated by adding a small letter, *e, w, s,* or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each land capability class and subclass is shown in table 5. The capability classification of map units in this survey area is given in table 4 and in the "Interpretive Groups" section.

Prime Farmland

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf

courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland where these limitations are overcome by drainage measures, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 200,000 acres, or nearly 78 percent of the survey area, meets the requirements for prime farmland. Scattered areas of this land are throughout the county, but most areas are on ground moraines, in the valleys of the Mad River and the Little Miami River, and along secondary streams. This land is mainly in associations 5, 7, 8, 9, 10, 11, and 12, which are described in Part I under the heading "General Soil Map Units."

About 163,000 acres of the prime farmland in the county is used for crops. The crops grown on this land, mainly corn, wheat, and soybeans, account for an estimated two-thirds of the county's total agricultural income each year.

The map units in the survey area that meet the requirements for prime farmland are listed in table 6. On some soils included in the table, measures that overcome limitations are needed. The need for these measures is indicated in parentheses after the map unit name. The location of each map unit is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units" in Part I. This list does not constitute a recommendation for a particular land use.

Unique Farmland

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil qualities, location, growing season, and moisture supply needed for the economic production of sustained high yields of a specific high-quality crop when treated and managed by acceptable farming methods. Examples of such crops are citrus, tree nuts, olives, cranberries, and vegetables.

Unique farmland has an adequate supply of available moisture for the specific crops for which it is used because of stored moisture, precipitation, or irrigation and has a combination of soil qualities, growing season, temperature, humidity, air drainage, elevation, aspect, and other factors, such as nearness to markets, that favors the production of a specific food or fiber crop.

Lists of unique farmland are developed as needed in cooperation with conservation districts and others.

Additional Farmland of Statewide Importance

Some areas other than areas of prime farmland and unique farmland are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas are determined by the appropriate state agency or agencies. Generally, additional farmland of statewide importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed by acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable. In some states additional farmland of statewide importance may include tracts of land that have been designated for agriculture by state law.

Additional Farmland of Local Importance

This land consists of areas that are of local importance in the production of food, feed, fiber, forage, and oilseed crops and are not identified as having national or statewide importance. Where appropriate, this land is identified by local agencies. It may include tracts of land that have been designated for agriculture by local ordinance.

Lists of this land are developed as needed in cooperation with conservation districts and others.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and have survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under a given climate. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

Table 7 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in this table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a nursery.

Woodland

James Bartlett, service forester, Ohio Department of Natural Resources, Division of Forestry, helped prepare this section.

Nearly all of Clark County was forested at the time of the earliest land surveys. The climax forest communities were dominantly beech, oak-sugar maple, and mixed oak on uplands and elm-ash forests in the very poorly drained areas, such as areas of Lippincott and Sloan soils (Gordon, 1966).

In 1982, about 13,700 acres, or 5.5 percent of the county, was woodland (USDA, 1971). Most of this acreage is in small scattered woodlots on slopes along stream valleys, on flood plains, and in undrained areas on uplands. Most of the woodland has been cut over, and much of it has been grazed.

The potential for increased production of timber is high. If managed well, woodlots are capable of producing high-quality, rapidly growing native hardwoods. In addition, many woodlots could provide firewood, edible nuts, wildlife habitat, aesthetic value, and protection from strong winds.

Some kind of conservation treatment is needed on about 70 percent of the woodland in the county (USDA, 1971). The major management concerns are grazing of the woodland by livestock and inadequately stocked timber stands. Timber stand improvement practices, including culling diseased and less desirable trees and cutting and spraying vines, improve the growth rate of favored species. Harvesting mature trees benefits desirable trees by reducing competition and the potential of disease. Species selected for planting on open ground should be matched with the slope and soil type. Planting in established woods is seldom needed or advised. Fencing livestock out of the woods and providing fire protection help to maintain good stands.

Information on woodland management is available from the Ohio Department of Natural Resources, Division of Forestry; the Cooperative Extension Service; and the Natural Resources Conservation Service.

Table 8 can be used by woodland managers in planning the use of soils for woodland crops. Only the soils that are suitable for woodland crops are listed.

Woodland Ordination System

In table 8 and in the section "Interpretive Groups," the ordination symbol for each soil is listed. The ordination system is a nationwide uniform system of labeling soils or groups of soils that are similar in use and management. The primary factors evaluated in the woodland ordination system are productivity of the woodland overstory tree species and the principal soil properties resulting in hazards and limitations that affect woodland management. There are three parts of the ordination system—class, subclass, and group. The class and subclass are referred to as the ordination symbol.

Ordination Class Symbol

The first element of the ordination symbol is a number that denotes potential productivity in terms of cubic meters of wood per hectare per year for the indicator tree species. The larger the number, the greater the potential productivity. Potential productivity is based on site index and the corresponding culmination of mean annual increment. For example, the number 1 indicates a potential production of 1 cubic meter of wood per hectare per year (14.3 cubic feet per acre per year) and the number 10 indicates a potential production of 10 cubic meters of wood per hectare per year (143 cubic feet per acre per year).

The *indicator species* is a species that is common in the area and is generally, but not necessarily, the most productive on the soil. It is the species that determines the ordination class. It is the first species listed for a particular map unit in table 8.

Site index is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a

specified number of years. The index applies to fully stocked, even-aged, unmanaged stands. The site indexes shown in table 8 are averages based on measurements made at sites that are representative of the soil series. When the site index and woodland productivity of different soils are compared, the values for the same tree species should be compared. The higher the site index number, the more productive the soil is for that species. Site index values are used in conjunction with yield tables to determine average annual yields. Indirectly, they are used to determine the productivity class in the ordination class symbol.

Ordination Subclass Symbol

The second element of the ordination symbol, or subclass, is a capital letter that indicates certain soil or physiographic characteristics that contribute to important hazards or limitations to be considered in management. The subclasses are defined as follows:

Subclass X indicates that woodland use and management are limited by stones or rocks.

Subclass W indicates that woodland use and management are significantly limited by excess water, either seasonally or throughout the year. Restricted drainage, a high water table, or flooding can adversely affect either stand development or management.

Subclass T indicates that the root zone has toxic substances. Excessive alkalinity, acidity, sodium salts, or other toxic substances impede the development of desirable species.

Subclass D indicates that woodland use and management are limited by a restricted rooting depth. The rooting depth is restricted by hard bedrock, a hardpan, or other restrictive layers in the soil.

Subclass C indicates that woodland use and management are limited by the kind or amount of clay in the upper part of the soil.

Subclass S indicates that the soil is sandy, has a low available water capacity, and normally has a low content of available plant nutrients. The use of equipment is limited during dry periods.

Subclass F indicates that woodland use and management are limited by a high content of rock fragments that are larger than 2 millimeters and smaller than 10 inches. This subclass includes flaggy soils.

Subclass R indicates that woodland use and management are limited by excessive slope.

Subclass A indicates that no significant limitations affect woodland use and management.

Woodland Management and Productivity

In table 8, the soils are rated for erosion hazard, equipment limitation, seedling mortality, windthrow hazard, and plant competition.

The *erosion hazard* is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive soil loss.

The *equipment limitation* is *slight* if the use of equipment is not limited to a particular kind of equipment or time of year, *moderate* if there is a short seasonal limitation or a need for some modification in the management of equipment, and *severe* if there is a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings are for seedlings that are from a good planting stock and that are properly planted during a period of average rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *windthrow hazard* is *slight* if trees in wooded areas are not expected to be blown down by commonly occurring winds, *moderate* if some trees are blown down during periods of excessive soil wetness and strong winds, and *severe* if many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Plant competition is *slight* if there is little or no competition from other plants, *moderate* if plant competition is expected to hinder the development of a fully stocked stand of desirable trees, and *severe* if plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The potential productivity of merchantable or *common trees* is expressed as a site index, which is described under the heading "Ordination Class Symbol." Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The column *trees to plant* in table 8 lists trees that are suitable for commercial wood production and that are suited to the soils.

Recreation

The soils in Clark County generally are moderately well suited to recreational development. The soils dominantly are very deep, are nearly level and gently sloping, and do not have many large stones or a high content of small stones. Most are not subject to flooding and do not have a clayey or sandy surface layer. Many wooded and hilly areas along stream valleys can provide scenic areas for camping, hiking, picnicking, and many other forms of outdoor activities. Well drained soils on flood plains have good potential for use as nature study areas, picnic areas, and paths and trails. The soils that are best suited to recreational development are in associations 1, 2, 4, and 11, which are described in Part I under the heading "General Soil Map Units."

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites, and either access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational uses by the duration of flooding and the season when it occurs. Onsite assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers and for outdoor activities that accompany such sites. These areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soils are rated on the basis of soil properties that influence the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and promote the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation after development. The surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Playgrounds are areas used intensively for baseball, football, or similar activities. These areas require nearly level soils that are free of stones and that can withstand heavy foot traffic and maintain an adequate cover of vegetation. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns in developing playgrounds. The surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Paths and trails are areas used for hiking and horseback riding. The areas should require little or no cutting and filling during site preparation. The soils are rated on the basis of soil properties that influence trafficability and erodibility. Paths and trails should remain firm under foot traffic and not be dusty when dry.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

The interpretive ratings in this table help engineers, planners, and others understand how soil properties influence recreational uses. Ratings for proposed uses are given in terms of limitations. Only the most restrictive features are listed. Other features may limit a specific recreational use.

The degree of soil limitation is expressed as slight, moderate, or severe.

Slight means that soil properties are favorable for

the rated use. The limitations are minor and can be easily overcome. Good performance and low maintenance are expected.

Moderate means that soil properties are moderately favorable for the rated use. The limitations can be overcome or modified by special planning, design, or maintenance. During some part of the year, the expected performance may be less desirable than that of soils rated *slight*.

Severe means that soil properties are unfavorable for the rated use. Examples of limitations are slope, bedrock near the surface, flooding, and a seasonal high water table. These limitations generally require major soil reclamation, special design, or intensive maintenance. Overcoming the limitations generally is difficult and costly.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 11 and interpretations for septic tank absorption fields in table 12.

Wildlife Habitat

Lynn T. Holtzman, private lands biologist, Ohio Department of Natural Resources, Division of Wildlife, helped prepare this section.

Wildlife habitat is directly related to soil and land use. Quality, type, and abundance of habitat limit the species and populations in an area. Many species of wildlife exist in Clark County, and most have varied in numbers over the years because of changes in land use. Cottontail rabbits, bobwhite quail, ring-necked pheasants, eastern meadowlarks, and bobolinks were once among the most abundant upland wildlife species. Populations of these species have declined recently, however, because of changes in land use, mainly farming practices. The conversion of pasture and hayland to row crop production, the removal of fencerows, and intensified cropping systems have contributed to the loss of upland wildlife habitat. White-tailed deer populations have increased in recent years, resulting partly from the availability of old pastures and woodlots that are no longer being grazed by livestock. Furbearers, such as red fox, gray fox, raccoon, skunks, opossum, and muskrat, are also relatively abundant. Many species of resident and migratory birds nest in the county. In addition, a few rare wildlife species, such as the spotted turtle and massasauga rattlesnake, also are in the survey aea.

Many areas in the valleys of the Mad River and the Little Miami River and their tributaries provide excellent habitat for all types of wildlife commonly found in the area. These areas also provide habitat and staging areas during waterfowl migration. If proper management is applied, all of the soils in Clark County can be used to provide food and cover for wildlife. Habitat for openland, wetland, and woodland wildlife can be incorporated into a single area to attract the widest variety of wildlife species.

Habitat for wetland wildlife can be further developed in undrained depressions and in old stream meanders on flood plains. Ponds and marshes provide habitat for songbirds, waterfowl, shore birds, and wetland furbearers. Special plantings help to attract waterfowl. Water level management can be incorporated in some of these areas to further enhance the value to wildlife.

Most of the upland soils in the county are well suited to plants that are valuable as wildlife food and cover. Grassland nesting areas are especially critical. Planting grasses and legumes helps to create these areas. Additional nesting cover can be provided by delaying the mowing of odd areas, such as ditch berms, roadsides, field edges, and pastures, until after August 1 of each year. Also, fruit-bearing shrubs can be planted in hedgerows and field borders to provide winter cover and food. Managing for food-producing trees and leaving hollow den trees improve woodlots as wildlife habitat. Cropland can also be valuable as wildlife habitat if managed properly.

Eroded soils can be developed into habitat for upland wildlife by planting grasses and legumes and shrubs. These plantings provide food and cover and help to control erosion.

Field windbreaks and shelterbelts around farm buildings can provide food and cover for wildlife if composed of suitable plant species. Creating special habitat through the use of artificial nesting structures, feeding stations, food patches, and wildflowers can attract specific songbirds.

Additional information on the development of wildlife habitat is available from the Ohio Department of Natural Resources, Division of Wildlife; the State game protector; or the Natural Resources Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area.

If the soils have potential for habitat development, wildlife habitat can be created or improved by planting appropriate vegetation, properly managing the existing plant cover, and fostering the natural establishment of desirable plants. In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be

Figure 4.—Areas of Sloan soils provide good habitat for wetland wildlife.

established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

Elements of Wildlife Habitat

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants used by wildlife. Examples are wheat, rye, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Examples are fescue, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, reed canarygrass, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, indiangrass, blueberry, goldenrod, lambsquarters, dandelions, blackberry, ragweed, wheatgrass, fescue, and nightshade.

The major soil properties affecting the growth of grain and forage crops and wild herbaceous plants are depth of the root zone, texture of the surface layer, the amount of water available to plants, wetness, and flooding. The length of the growing season also is important.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage that wildlife eat. Examples are oak, poplar, boxelder, birch, maple, green ash, willow, and American elm. Examples of fruit-producing shrubs that are suitable for planting on soils that have good potential for these plants are hawthorn, honeysuckle, American plum, redosier dogwood, chokecherry, serviceberry, silver buffaloberry, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that provide habitat or supply food in the form of browse, seed, or fruitlike cones. Examples are pine, spruce, hemlock, fir, yew, cedar, larch, and juniper.

The major soil properties affecting the growth of hardwood and coniferous trees and shrubs are depth of the root zone, the amount of water available to plants, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Wetland plants produce food or cover for wetland wildlife. Examples of these plants are smartweed, wild millet, rushes, sedges, bulrushes, wild rice, arrowhead, waterplantain, pickerelweed, and cattail.

The major soil properties affecting wetland plants are texture of the surface layer, wetness, acidity or alkalinity, and slope.

Shallow water areas have an average depth of less than 5 feet. They are useful as habitat for some wildlife species. They are naturally wet areas or are created by dams, levees, or water-control measures in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability.

Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include pheasant, quail, meadowlark, field sparrow, killdeer, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of hardwoods or conifers or a mixture of these and associated grasses, legumes, and wild herbaceous plants. The wildlife attracted to this habitat include thrushes, woodpeckers, owls, tree squirrels, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas that support water-tolerant plants (fig. 4). The wildlife attracted to this habitat include ducks, geese, herons, bitterns, rails, kingfishers, muskrat, otter, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and

observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. It also shows the suitability of the soils for use as a daily cover for landfill.

Soil properties are important in selecting sites for sanitary facilities and in identifying limiting soil properties and site features to be considered in planning, design, and installation. Soil limitation ratings of *slight, moderate,* or *severe* are given for septic tank absorption fields, sewage lagoons, and trench and area sanitary landfills. Soil suitability ratings of *good, fair,* and *poor* are given for daily cover for landfill.

A rating of *slight* or *good* indicates that the soils have no limitations or that the limitations can be easily overcome. Good performance and low maintenance can be expected. A rating of *moderate* or *fair* indicates that the limitations should be recognized but generally can be overcome by good management or special design. A rating of *severe* or *poor* indicates that overcoming the limitations is difficult or impractical. Increased maintenance may be required.

Septic tank absorption fields are areas in which subsurface systems of tile or perforated pipe distribute effluent from a septic tank into the natural soil. The centerline of the tile is assumed to be at a depth of 24 inches. Only the part of the soil between depths of 24 and 60 inches is considered in making the ratings. The soil properties and site features considered are those that affect the absorption of the effluent, those that affect the construction and maintenance of the system, and those that may affect public health.

The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the

solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted, relatively impervious soil material. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Relatively impervious soil material for the lagoon floor and sides is desirable to minimize seepage and contamination of local ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Trench sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil that is excavated from the trench. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. Soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations in rating the soils.

Area sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil that is imported from a source away from the site. A final cover of soil at least 2 feet thick is placed over the completed landfill. Soil properties that influence trafficability, revegetation, and the risk of pollution are the main considerations in rating the soils for area sanitary landfills.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The suitability of a soil for use as cover is based on properties that affect workability and the ease of digging, moving, and spreading the material over the refuse daily during both wet and dry periods.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Waste Management

Soil properties are important when organic waste is applied as fertilizer and wastewater is applied in irrigated areas. They also are important when the soil is used as a medium for the treatment and disposal of the organic waste and wastewater. Unfavorable soil properties can result in environmental damage.

The use of organic waste and wastewater as production resources results in energy and resource conservation and minimizes the problems associated with waste disposal. If disposal is the goal, applying a maximum amount of the organic waste or the wastewater to a minimal area holds costs to a minimum and environmental damage is the main hazard. If reuse is the goal, a minimum amount should be applied to a maximum area and environmental damage is unlikely.

Interpretations developed for waste management may include ratings for manure- and food-processing waste, municipal sewage sludge, use of wastewater

for irrigation, and treatment of wastewater by slow rate, overland flow, and rapid infiltration processes.

Specific information regarding waste management is available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In the table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have one or more of the following characteristics: a plasticity index of more than 10, a high shrink-swell potential, many stones, slopes of more than 25 percent, or a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity in or below the soil is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less

than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In table 14, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff.

Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct

surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

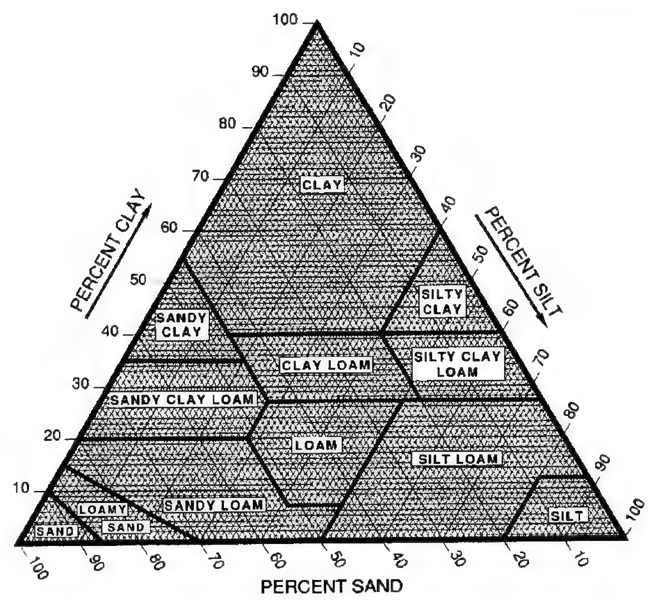

Figure 5.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the soil series descriptions in Part I of this survey.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 5). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and

maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the soil series descriptions in Part I of this survey.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In table 16, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH

of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the soil. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties are the content of silt plus very fine sand, the content of sand coarser than very fine sand, the content of organic matter, soil structure, and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor Kf is one of the factors used in the Revised Universal Soil Loss Equation (RUSLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. It shows the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum annual rate of soil erosion that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gullying, and the value of nutrients lost through erosion.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. Soils are assigned to wind erodibility groups (WEG) having similar percentages of dry soil aggregates larger than 0.84 millimeter. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils generally are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams that have more than 5 percent finely divided calcium carbonate. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams,

and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils have less than 5 percent finely divided calcium carbonate. They are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to soil blowing, or the tons per acre per year that can be expected to be lost to soil blowing. There is a close correlation between soil blowing and the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil Features

Table 17 gives estimates of several important soil features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 18 gives estimates of several important water features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Hydrologic soil groups are groups of soils that, when saturated, have the same runoff potential under similar storm and ground cover conditions. The soil properties that affect the runoff potential are those that influence the minimum rate of infiltration in a bare soil after prolonged wetting and when the soil is not frozen. These properties include the depth to a seasonal high water table, the infiltration rate, permeability after prolonged wetting, and the depth to a very slowly permeable layer. The influences of ground cover and slope are treated independently and are not taken into account in hydrologic soil groups.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil layers.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have a moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils that have a moderately fine or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clayey soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 18, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in marshes and swamps or in closed depressions is considered to be ponding.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur. Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable; *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year).

Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 to 30 days), and *very long* (more than 30 days). The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is a zone of saturation at the highest average depth during the wettest season. It is at least 6 inches thick, persists in the soil for more than a few weeks, and is within 6 feet of the surface. Indicated in table 18 are the depth to the

seasonal high water table, the kind of water table, and the months of the year when the water table usually is highest.

An *apparent* water table is indicated by the level at which water stands in a freshly dug, unlined borehole after adequate time for adjustments in the surrounding soil. A *perched* water table is one that is above an unsaturated zone in the soil. The basis for determining that a water table is perched may be general knowledge of the area. The water table is proven to be perched if the water level in a borehole is observed to fall when the borehole is extended.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. *Ponding duration* classes are the same as those for flooding. *Maximum ponding depth* refers to the depth of the water above the surface of the soil.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. The normal flood plain of a stream, subject to flooding.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric

layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field*

capacity, normal moisture capacity, or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or

unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Krotovinas. Irregular tubular streaks within one layer of material transported from another layer. Caused by the filling of tunnels made by burrowing animals in one layer with material from outside the layer. They appear as rounded or elliptical volumes of various sizes. They may have colors contrasting (light or dark) with those of the layer in which they appear, and their texture and structure may be unlike those of the soil around them.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct

lake, filled in by well sorted, stratified sediments.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The

rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in

diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil

normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Classification of the Soils

(This classification does not include recent amendments to soil taxonomy for cation-exchange activity, particle-size modifier, and dual mineralogy for strongly contrasting classes. More detailed information is available at local offices of the Natural Resources Conservation Service)

Soil name	Family or higher taxonomic class
Adrian	Terric Medisaprists, sandy or sandy-skeletal, mixed, euic, mesic
Carlisle	Typic Medisaprists, euic, mesic
Casco	Typic Hapludalfs, fine-loamy over sandy or sandy-skeletal, mixed, mesic
Celina	Aquic Hapludalfs, fine, mixed, mesic
Crosby	Aeric Ochraqualfs, fine, mixed, mesic
Donnelsville	Eutrochreptic Rendolls, loamy-skeletal, carbonatic, mesic
Drummer	Typic Haplaquolls, fine-silty, mixed, mesic
Eldean	Typic Hapludalfs, fine, mixed, mesic
Genesee	Fluventic Eutrochrepts, fine-loamy, mixed, mesic
Kokomo	Typic Argiaquolls, fine, mixed, mesic
Linwood	Terric Medisaprists, loamy, mixed, euic, mesic
Lippincott	Typic Argiaquolls, fine, mixed, mesic
Miamian	Typic Hapludalfs, fine, mixed, mesic
Milford	Typic Haplaquolls, fine, mixed, mesic
Millsdale	Typic Argiaquolls, fine, mixed, mesic
Milton	Typic Hapludalfs, fine, mixed, mesic
Ockley	Typic Hapludalfs, fine-loamy, mixed, mesic
Patton	Typic Haplaquolls, fine-silty, mixed, mesic
Randolph	Aeric Ochraqualfs, fine, mixed, mesic
Rodman	Typic Hapludolls, sandy-skeletal, mixed, mesic
Ross	Cumulic Hapludolls, fine-loamy, mixed, mesic
Rush	Typic Hapludalfs, fine-silty, mixed, mesic
Savona	Aeric Ochraqualfs, fine, mixed, mesic
Sloan	Fluvaquentic Haplaquolls, fine-loamy, mixed, mesic
Strawn	Typic Hapludalfs, fine-loamy, mixed, mesic
Thackery	Aquic Hapludalfs, fine-loamy, mixed, mesic
Tremont	Cumulic Haplaquolls, fine-loamy, mixed (calcareous), mesic
Udorthents	Typic Udorthents, fine-loamy, mixed, mesic
Wallkill	Thapto-Histic Fluvaquents, fine-loamy, mixed, nonacid, mesic
Warsaw	Typic Argiudolls, fine-loamy over sandy or sandy-skeletal, mixed, mesic
Waupecan	Typic Argiudolls, fine-silty, mixed, mesic
Waynetown	Aeric Ochraqualfs, fine-silty, mixed, mesic
Westland	Typic Argiaquolls, fine-loamy, mixed, mesic

Table 2.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
Ad	Adrian muck, drained	803	0.3
Ae	Adrian muck, undrained	247	*
Ca	Carlisle muck, drained	125	*
Cb	Carlisle muck, undrained	509	0.2
CcD2	Casco gravelly loam, 12 to 20 percent slopes, eroded	534	0.2
CeA	Celina silt loam, 0 to 2 percent slopes	6,546	2.5
CeB	Celina silt loam, 2 to 6 percent slopes	5,569	2.2
ChA	Celina-Strawn complex, 0 to 2 percent slopes	2,518	1.0
ChB	Celina-Strawn complex, 2 to 6 percent slopes	4,553	1.8
CrA	Crosby silt loam, 0 to 2 percent slopes	20,979	8.2
CrB	Crosby silt loam, 2 to 6 percent slopes	632	0.2
DoE	Donnelsville channery silt loam, 18 to 30 percent slopes	239	*
DpF	Donnelsville-Rock outcrop complex, 30 to 70 percent slopes	280	0.1
Dr	Drummer silty clay loam, gravelly substratum	3,733	1.5
EmA	Eldean silt loam, 0 to 2 percent slopes	9,310	3.6
EmB	Eldean silt loam, 2 to 6 percent slopes	5,442	2.1
EmB2	Eldean silt loam, 2 to 6 percent slopes, eroded	1,517	0.6
EmC2	Eldean silt loam, 6 to 12 percent slopes, eroded	778	0.3
EnC2	Eldean-Casco complex, 6 to 12 percent slopes, eroded	311	0.1
EpB2	Eldean-Miamian complex, 2 to 6 percent slopes, eroded	3,305	1.3
EpC2	Eldean-Miamian complex, 6 to 12 percent slopes, eroded	6,206	2.4
EpC3	Eldean-Miamian complex, 6 to 12 percent slopes, severely eroded	1,236	0.5
EpD2	Eldean-Miamian complex, 12 to 18 percent slopes, eroded	3,355	1.3
EpD3	Eldean-Miamian complex, 12 to 18 percent slopes, severely eroded	550	0.2
EpE2	Eldean-Miamian complex, 18 to 30 percent slopes, eroded	580	0.2
EsE3	Eldean-Rodman complex, 18 to 30 percent slopes, severely eroded	212	*
EuB	Eldean-Urban land complex, 2 to 6 percent slopes	1,655	0.6
EuC	Eldean-Urban land complex, 6 to 12 percent slopes	697	0.3
Ge	Genesee silt loam, till substratum, rarely flooded	246	*
Gn	Genesee silt loam, till substratum, occasionally flooded	1,637	0.6
Ko	Kokomo silty clay loam	37,430	14.6
Lg	Linwood muck, undrained	166	*
Lh	Linwood mucky silt loam, drained	809	0.3
Lm	Lippincott mucky silt loam	616	0.2
Lp	Lippincott silty clay loam	8,655	3.4
Lu	Lippincott-Urban land complex	237	*
MgB2	Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded	496	0.2
MgC2	Miamian silty clay loam, limestone substratum, 6 to 12 percent slopes, eroded	102	*
MgE2	Miamian silty clay loam, limestone substratum, 18 to 30 percent slopes, eroded	190	*
MhA	Miamian silt loam, 0 to 2 percent slopes	3,888	1.5
MhB	Miamian silt loam, 2 to 6 percent slopes	20,418	7.9
MhB2	Miamian silt loam, 2 to 6 percent slopes, eroded	5,122	2.0
MhC	Miamian silt loam, 6 to 12 percent slopes	1,406	0.5
MhC2	Miamian silt loam, 6 to 12 percent slopes, eroded	949	0.4
MhD2	Miamian silt loam, 12 to 18 percent slopes, eroded	394	0.2
MhE	Miamian silt loam, 18 to 30 percent slopes	773	0.3
MhE2	Miamian silt loam, 18 to 30 percent slopes, eroded	683	0.3
MkB2	Miamian silty clay loam, 2 to 6 percent slopes, eroded	7,892	3.1
MkC2	Miamian silty clay loam, 6 to 12 percent slopes, eroded	5,201	2.0
MkD2	Miamian silty clay loam, 12 to 18 percent slopes, eroded	1,230	0.5
MmC3	Miamian clay loam, 6 to 12 percent slopes, severely eroded	2,719	1.1
MmD3	Miamian clay loam, 12 to 18 percent slopes, severely eroded	871	0.3
MmE3	Miamian clay loam, 18 to 30 percent slopes, severely eroded	663	0.3
MnB	Miamian-Urban land complex, 2 to 6 percent slopes	2,635	1.0
MnC	Miamian-Urban land complex, 6 to 12 percent slopes	245	*
Mo	Milford silty clay loam, sandy substratum	2,293	0.9
Ms	Millsdale silty clay loam	1,215	0.5
MtA	Milton silt loam, 0 to 2 percent slopes	463	0.2
MtB	Milton silt loam, 2 to 6 percent slopes	877	0.3
MvC2	Milton silty clay loam, 6 to 12 percent slopes, eroded	500	0.2
MxB	Milton-Urban land complex, 2 to 6 percent slopes	469	0.2
OcA	Ockley silt loam, 0 to 2 percent slopes	5,044	2.0

See footnote at end of table.

Table 2.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
OcB	Ockley silt loam, 2 to 6 percent slopes	641	0.2
Pa	Patton silty clay loam	530	0.2
Pg	Pits, gravel	530	0.2
Ph	Pits, quarry	182	*
RaA	Randolph silt loam, 0 to 2 percent slopes	350	0.1
RgE	Rodman gravelly loam, 18 to 35 percent slopes	1,845	0.7
Rn	Ross silt loam, occasionally flooded	2,385	0.9
Ro	Ross silty clay loam, rarely flooded	690	0.3
RuA	Rush silt loam, 0 to 2 percent slopes	1,756	0.7
ScA	Savona silt loam, 0 to 2 percent slopes	844	0.3
So	Sloan silt loam, sandy substratum, occasionally flooded	5,676	2.2
StB2	Strawn silty clay loam, 2 to 6 percent slopes, eroded	9,246	3.6
StC2	Strawn silty clay loam, 6 to 12 percent slopes, eroded	5,650	2.2
StD2	Strawn silty clay loam, 12 to 18 percent slopes, eroded	1,408	0.5
StE2	Strawn silty clay loam, 18 to 35 percent slopes, eroded	37	*
SuA	Strawn-Crosby complex, 0 to 2 percent slopes	2,355	0.9
SuB	Strawn-Crosby complex, 2 to 6 percent slopes	1,421	0.6
ThA	Thackery silt loam, 0 to 2 percent slopes	1,259	0.5
Tr	Tremont silty clay loam, rarely flooded	1,398	0.5
Ts	Tremont silt loam, occasionally flooded	2,684	1.0
Ud	Udorthents, loamy	1,443	0.6
Ur	Urban land	1,176	0.5
W	Water	3,595	1.4
Wc	Wallkill silt loam, occasionally flooded	258	0.1
WeA	Warsaw silt loam, 0 to 3 percent slopes	1,168	0.5
WpA	Waupecan silt loam, 0 to 2 percent slopes	1,226	0.5
WrA	Waynetown silt loam, 0 to 2 percent slopes	989	0.4
Wt	Westland silty clay loam	7,186	2.8
	Total	256,883	100.0

* Less than 0.05 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.9 percent of the survey area.

Table 3.--Main Cropland Limitations and Hazards

(See text for a description of the limitations and hazards listed in this table. Only the soils suitable for cultivated crops are listed)

Map symbol and soil name	Cropland limitations or hazards
Ad:	
Adrian	Excessive permeability Frost heave Ponding Potential for ground-water pollution Seasonal high water table Subsidence of organic matter
Ca:	
Carlisle	Frost heave Ponding Potential for ground-water pollution Seasonal high water table Subsidence of organic matter
CeA:	
Celina	Frost heave Limited organic matter content Surface compaction Surface crusting
CeB:	
Celina	Easily eroded Frost heave Limited organic matter content Surface compaction Surface crusting
ChA:	
Celina	Frost heave Limited organic matter content Surface compaction Surface crusting
Strawn	Limited organic matter content Surface compaction Surface crusting
ChB:	
Celina	Easily eroded Frost heave Limited organic matter content Surface compaction Surface crusting
Strawn	Easily eroded Fair tilth Limited organic matter content Surface compaction Surface crusting
CrA:	
Crosby	Frost heave Limited available water capacity Limited organic matter content Restricted permeability Seasonal high water table Surface compaction Surface crusting

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
CrB:	
Crosby	Easily eroded
	Frost heave
	Limited available water capacity
	Limited organic matter content
	Restricted permeability
	Seasonal high water table
	Surface compaction
	Surface crusting
Dr:	
Drummer	Excessive permeability
	Fair tilth
	Frost heave
	Ponding
	Potential for ground-water pollution
	Seasonal high water table
	Surface compaction
EmA:	
Eldean	Excessive permeability
	Limited available water capacity
	Limited organic matter content
	Potential for ground-water pollution
	Surface compaction
	Surface crusting
EmB:	
Eldean	Easily eroded
	Excessive permeability
	Limited available water capacity
	Limited organic matter content
	Potential for ground-water pollution
	Surface compaction
	Surface crusting
EmB2:	
Eldean	Easily eroded
	Excessive permeability
	Limited available water capacity
	Limited organic matter content
	Part of surface removed
	Potential for ground-water pollution
	Surface compaction
	Surface crusting
EmC2:	
Eldean	Easily eroded
	Excessive permeability
	Limited available water capacity
	Limited organic matter content
	Part of surface removed
	Potential for ground-water pollution
	Surface compaction
	Surface crusting
EnC2:	
Eldean	Easily eroded
	Excessive permeability
	Limited organic matter content
	Part of surface removed
	Potential for ground-water pollution
	Surface compaction

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
EnC2:	
Casco	Easily eroded Excessive permeability Limited organic matter content Part of surface removed Potential for ground-water pollution
EpB2:	
Eldean	Excessive permeability Limited organic matter content Part of surface removed Potential for ground-water pollution Surface compaction
Miamian	Easily eroded Fair tilth Limited organic matter content Part of surface removed Surface compaction Surface crusting
EpC2:	
Eldean	Easily eroded Excessive permeability Limited organic matter content Part of surface removed Potential for ground-water pollution Surface compaction
Miamian	Easily eroded Limited organic matter content Part of surface removed Surface compaction Surface crusting
EpC3:	
Eldean	Easily eroded Excessive permeability Limited organic matter content Most of surface removed Poor tilth Potential for ground-water pollution Surface compaction
Miamian	Easily eroded Limited organic matter content Most of surface removed Poor tilth Surface compaction
EpD2:	
Eldean	Easily eroded Excessive permeability Limited organic matter content Part of surface removed Potential for ground-water pollution Slope Surface compaction

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
EpD2:	
Miamian	Easily eroded Limited organic matter content Part of surface removed Slope Surface compaction Surface crusting
Ge:	
Genesee	Excessive permeability Limited organic matter content Potential for ground-water pollution Rare flooding Surface compaction Surface crusting
Gn:	
Genesee	Excessive permeability Limited organic matter content Occasional flooding Potential for ground-water pollution Surface compaction Surface crusting
Ko:	
Kokomo	Fair tilth Frost heave Ponding Potential for ground-water pollution Seasonal high water table Surface compaction
Lh:	
Linwood	Frost heave Ponding Potential for ground-water pollution Seasonal high water table
Lm:	
Lippincott	Excessive permeability Ponding Potential for ground-water pollution Seasonal high water table
Lp:	
Lippincott	Excessive permeability Fair tilth Limited available water capacity Ponding Potential for ground-water pollution Seasonal high water table Surface compaction
MgB2:	
Miamian	Easily eroded Fair tilth Limited organic matter content Part of surface removed Potential for ground-water pollution Restricted permeability Surface compaction Surface crusting

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
MgC2:	
Miamian	Easily eroded Fair tilth Limited organic matter content Part of surface removed Potential for ground-water pollution Restricted permeability Surface compaction Surface crusting
MhA:	
Miamian	Limited organic matter content Surface compaction Surface crusting
MhB:	
Miamian	Easily eroded Limited organic matter content Surface compaction Surface crusting
MhB2:	
Miamian	Easily eroded Limited organic matter content Part of surface removed Surface compaction Surface crusting
MhC:	
Miamian	Easily eroded Limited organic matter content Surface compaction Surface crusting
MhC2:	
Miamian	Easily eroded Limited organic matter content Part of surface removed Surface compaction Surface crusting
MhD2:	
Miamian	Easily eroded Limited organic matter content Part of surface removed Slope Surface compaction Surface crusting
MkB2:	
Miamian	Easily eroded Fair tilth Limited organic matter content Part of surface removed Surface compaction Surface crusting
MkC2:	
Miamian	Easily eroded Fair tilth Limited organic matter content Part of surface removed Surface compaction Surface crusting

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
MkD2:	
Miamian	Easily eroded Fair tilth Limited organic matter content Part of surface removed Slope Surface compaction Surface crusting
MmC3:	
Miamian	Easily eroded Limited organic matter content Most of surface removed Poor tilth Surface compaction
Mo:	
Milford	Fair tilth Frost heave Ponding Potential for ground-water pollution Seasonal high water table Surface compaction
Ms:	
Millsdale	Depth to rock Fair tilth Frost heave Limited available water capacity Ponding Potential for ground-water pollution Restricted permeability Seasonal high water table Surface compaction
MtA:	
Milton	Depth to rock Limited available water capacity Limited organic matter content Potential for ground-water pollution Surface compaction Surface crusting
MtB:	
Milton	Depth to rock Easily eroded Limited available water capacity Limited organic matter content Potential for ground-water pollution Surface compaction Surface crusting
MvC2:	
Milton	Depth to rock Easily eroded Fair tilth Limited available water capacity Limited organic matter content Part of surface removed Potential for ground-water pollution Surface compaction Surface crusting

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
OcA:	
Ockley	Excessive permeability Limited organic matter content Potential for ground-water pollution Surface compaction Surface crusting
OcB:	
Ockley	Excessive permeability Limited organic matter content Potential for ground-water pollution Surface compaction Surface crusting
Pa:	
Patton	Fair tilth Frost heave Ponding Potential for ground-water pollution Seasonal high water table Surface compaction
RaA:	
Randolph	Depth to rock Frost heave Limited available water capacity Limited organic matter content Potential for ground-water pollution Seasonal high water table Surface compaction Surface crusting
Rn:	
Ross	Occasional flooding Surface compaction
Ro:	
Ross	Fair tilth Rare flooding Surface compaction
RuA:	
Rush	Excessive permeability Frost heave Limited organic matter content Potential for ground-water pollution Surface compaction Surface crusting
ScA:	
Savona	Excessive permeability Frost heave Limited organic matter content Potential for ground-water pollution Seasonal high water table Surface compaction Surface crusting

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
So:	
Sloan	Excessive permeability Frost heave Occasional flooding Potential for ground-water pollution Seasonal high water table Surface compaction
StB2:	
Strawn	Easily eroded Fair tilth Limited organic matter content Part of surface removed Surface compaction Surface crusting
StC2:	
Strawn	Easily eroded Fair tilth Limited organic matter content Part of surface removed Surface compaction Surface crusting
StD2:	
Strawn	Easily eroded Fair tilth Limited organic matter content Part of surface removed Slope Surface compaction Surface crusting
SuA:	
Strawn	Limited organic matter content Surface compaction Surface crusting
Crosby	Frost heave Limited organic matter content Restricted permeability Seasonal high water table Surface compaction Surface crusting
SuB:	
Strawn	Easily eroded Limited organic matter content Surface compaction Surface crusting
Crosby	Easily eroded Frost heave Limited organic matter content Restricted permeability Seasonal high water table Surface compaction Surface crusting

Table 3.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
ThA:	
Thackery	Excessive permeability Frost heave Limited organic matter content Potential for ground-water pollution Surface compaction Surface crusting
Tr:	
Tremont	Fair tilth Frost heave Potential for ground-water pollution Rare flooding Seasonal high water table Surface compaction
Ts:	
Tremont	Frost heave Occasional flooding Potential for ground-water pollution Seasonal high water table Surface compaction
Wc:	
Wallkill	Frost heave Occasional flooding Ponding Potential for ground-water pollution Seasonal high water table Surface compaction
WeA:	
Warsaw	Excessive permeability Potential for ground-water pollution Surface compaction
WpA:	
Waupecan	Excessive permeability Frost heave Potential for ground-water pollution Surface compaction
WrA:	
Waynetown	Excessive permeability Frost heave Limited organic matter content Potential for ground-water pollution Seasonal high water table Surface compaction Surface crusting
Wt:	
Westland	Excessive permeability Fair tilth Frost heave Ponding Potential for ground-water pollution Seasonal high water table Surface compaction

Table 4.--Land Capability and Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-alfalfa hay
		Bu	Bu	Bu	Bu	Tons
Ad--------------- Adrian	IVw	120	40	52	70	3.5
Ae--------------- Adrian	Vw	---	---	---	---	---
Ca--------------- Carlisle	IIIw	105	35	50	70	---
Cb--------------- Carlisle	Vw	---	---	---	---	---
CcD2------------- Casco	VIe	65	---	---	45	3.5
CeA-------------- Celina	I	120	40	52	70	6.5
CeB-------------- Celina	IIe	115	40	50	70	6.5
ChA-------------- Celina-Strawn	I	115	40	50	70	6.5
ChB-------------- Celina-Strawn	IIe	110	40	48	70	6.5
CrA-------------- Crosby	IIw	120	40	52	70	6.5
CrB-------------- Crosby	IIe	115	40	50	70	6.5
DoE-------------- Donnelsville	VIe	---	---	---	---	---
DpF:						
Donnelsville-----	VIIe	---	---	---	---	---
Rock outcrop.						
Dr--------------- Drummer	IIw	145	50	50	80	6.5
EmA-------------- Eldean	IIs	115	40	50	70	5.0
EmB-------------- Eldean	IIe	110	40	48	70	5.0
EmB2------------- Eldean	IIe	105	35	46	70	5.0
EmC2------------- Eldean	IIIe	85	30	38	60	4.5

Table 4.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-alfalfa hay
		Bu	Bu	Bu	Bu	Tons
EnC2------------- Eldean-Casco	IIIe	80	25	36	60	4.0
EpB2------------- Eldean-Miamian	IIe	110	40	48	70	5.0
EpC2------------- Eldean-Miamian	IIIe	105	35	46	70	4.5
EpC3------------- Eldean-Miamian	IVe	80	25	36	60	4.0
EpD2------------- Eldean-Miamian	IVe	78	22	34	---	3.5
EpD3------------- Eldean-Miamian	VIe	54	16	21	---	3.0
EpE2------------- Eldean-Miamian	VIe	---	---	---	---	---
EsE3------------- Eldean-Rodman	VIe	---	---	---	---	---
EuB, EuC. Eldean-Urban land						
Ge--------------- Genesee	IIw	125	45	52	70	5.5
Gn--------------- Genesee	IIw	115	40	---	---	5.5
Ko--------------- Kokomo	IIw	140	50	58	75	6.5
Lg--------------- Linwood	Vw	---	---	---	---	---
Lh--------------- Linwood	IIw	105	35	50	70	---
Lm, Lp----------- Lippincott	IIw	125	45	54	70	6.5
Lu. Lippincott-Urban land						
MgB2------------- Miamian	IIe	105	35	46	70	5.0
MgC2------------- Miamian	IIIe	85	30	38	60	4.5
MgE2------------- Miamian	VIe	---	---	---	---	---

Table 4.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-alfalfa hay
		Bu	Bu	Bu	Bu	Tons
MhA-------------- Miamian	I	125	45	54	70	6.0
MhB-------------- Miamian	IIe	120	40	52	70	6.0
MhB2------------- Miamian	IIe	115	40	50	70	6.0
MhC-------------- Miamian	IIIe	100	35	44	65	4.5
MhC2------------- Miamian	IIIe	95	30	42	65	4.5
MhD2------------- Miamian	IVe	---	---	---	---	4.0
MhE, MhE2-------- Miamian	VIe	---	---	---	---	---
MkB2------------- Miamian	IIe	110	40	48	70	6.0
MkC2------------- Miamian	IIIe	90	30	40	65	4.0
MkD2------------- Miamian	IVe	---	---	---	---	4.0
MmC3------------- Miamian	IVe	85	30	38	60	4.0
MmD3------------- Miamian	VIe	60	22	25	---	---
MmE3------------- Miamian	VIe	---	---	---	---	---
MnB, MnC. Miamian-Urban land						
Mo--------------- Milford	IIIw	140	50	58	75	6.5
Ms--------------- Millsdale	IIIw	120	40	52	70	5.5
MtA-------------- Milton	IIs	110	40	48	70	5.0
MtB-------------- Milton	IIe	105	35	46	70	5.0
MvC2------------- Milton	IIIe	75	25	34	60	4.5
MxB. Milton-Urban land						

Table 4.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-alfalfa hay
		Bu	Bu	Bu	Bu	Tons
OcA--------------- Ockley	I	120	40	52	70	6.0
OcB--------------- Ockley	IIe	115	40	50	70	6.0
Pa---------------- Patton	IIw	135	45	58	70	6.5
Pg. Pits, gravel						
Ph. Pits, quarry						
RaA--------------- Randolph	IIIw	115	40	50	70	6.0
RgE--------------- Rodman	VIIs	---	---	---	---	---
Rn---------------- Ross	IIw	135	45	---	---	5.5
Ro---------------- Ross	I	150	50	60	80	6.5
RuA--------------- Rush	I	125	45	54	70	6.5
ScA--------------- Savona	IIw	120	40	52	70	6.5
So---------------- Sloan	IIIw	115	40	---	---	5.5
StB2-------------- Strawn	IIe	105	35	46	70	6.0
StC2-------------- Strawn	IIIe	85	30	38	60	4.5
StD2-------------- Strawn	IVe	---	---	---	---	3.5
StE2-------------- Strawn	VIe	---	---	---	---	---
SuA--------------- Strawn-Crosby	IIw	115	40	50	70	6.5
SuB--------------- Strawn-Crosby	IIe	110	40	48	70	6.5
ThA--------------- Thackery	I	115	40	50	70	6.5
Tr---------------- Tremont	I	150	50	60	80	6.5

Table 4.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-alfalfa hay
		Bu	Bu	Bu	Bu	Tons
Ts: Tremont	IIw	135	45	---	---	6.0
Ud. Udorthents						
Ur. Urban land						
Wc: Wallkill	IIIw	100	35	---	---	3.5
WeA: Warsaw	IIs	115	40	50	70	5.0
WpA: Waupecan	I	155	60	60	80	7.0
WrA: Waynetown	IIw	130	45	56	70	6.5
Wt: Westland	IIw	145	50	58	80	6.5

Table 5.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (subclass)		
		Erosion (e)	Wetness (w)	Soil problems (s)
		Acres	Acres	Acres
I	23,318	---	---	---
II	172,819	72,095	89,783	10,941
III	31,436	21,519	9,917	---
IV	11,269	10,466	803	---
V	922	---	922	---
VI	5,247	5,247	---	---
VII	2,210	280	---	1,930
VIII	---	---	---	---

Table 6.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
CeA	Celina silt loam, 0 to 2 percent slopes
CeB	Celina silt loam, 2 to 6 percent slopes
ChA	Celina-Strawn complex, 0 to 2 percent slopes
ChB	Celina-Strawn complex, 2 to 6 percent slopes
CrA	Crosby silt loam, 0 to 2 percent slopes (where drained)
CrB	Crosby silt loam, 2 to 6 percent slopes (where drained)
Dr	Drummer silty clay loam, gravelly substratum (where drained)
EmA	Eldean silt loam, 0 to 2 percent slopes
EmB	Eldean silt loam, 2 to 6 percent slopes
EmB2	Eldean silt loam, 2 to 6 percent slopes, eroded
EpB2	Eldean-Miamian complex, 2 to 6 percent slopes, eroded
Ge	Genesee silt loam, till substratum, rarely flooded
Gn	Genesee silt loam, till substratum, occasionally flooded
Ko	Kokomo silty clay loam (where drained)
Lm	Lippincott mucky silt loam (where drained)
Lp	Lippincott silty clay loam (where drained)
MgB2	Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded
MhA	Miamian silt loam, 0 to 2 percent slopes
MhB	Miamian silt loam, 2 to 6 percent slopes
MhB2	Miamian silt loam, 2 to 6 percent slopes, eroded
MkB2	Miamian silty clay loam, 2 to 6 percent slopes, eroded
Mo	Milford silty clay loam, sandy substratum (where drained)
Ms	Millsdale silty clay loam (where drained)
MtA	Milton silt loam, 0 to 2 percent slopes
MtB	Milton silt loam, 2 to 6 percent slopes
OcA	Ockley silt loam, 0 to 2 percent slopes
OcB	Ockley silt loam, 2 to 6 percent slopes
Pa	Patton silty clay loam (where drained)
RaA	Randolph silt loam, 0 to 2 percent slopes (where drained)
Rn	Ross silt loam, occasionally flooded
Ro	Ross silty clay loam, rarely flooded
RuA	Rush silt loam, 0 to 2 percent slopes
ScA	Savona silt loam, 0 to 2 percent slopes (where drained)
So	Sloan silt loam, sandy substratum, occasionally flooded (where drained)
StB2	Strawn silty clay loam, 2 to 6 percent slopes, eroded
SuA	Strawn-Crosby complex, 0 to 2 percent slopes (where drained)
SuB	Strawn-Crosby complex, 2 to 6 percent slopes (where drained)
ThA	Thackery silt loam, 0 to 2 percent slopes
Tr	Tremont silty clay loam, rarely flooded
Ts	Tremont silt loam, occasionally flooded
WeA	Warsaw silt loam, 0 to 3 percent slopes
WpA	Waupecan silt loam, 0 to 2 percent slopes
WrA	Waynetown silt loam, 0 to 2 percent slopes (where drained)
Wt	Westland silty clay loam (where drained)

Table 7.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Ad: Adrian	Whitebelle honeysuckle, common ninebark.	Silky dogwood, Amur privet, Amur honeysuckle, nannyberry.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.
Ca: Carlisle	---	Silky dogwood, sargent crabapple, common ninebark, common lilac, southern arrowwood, nannyberry, American cranberrybush.	Black Hills spruce	Green ash, Norway spruce, eastern white pine.	Imperial Carolina poplar.
CcD2: Casco	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
CeA, CeB: Celina	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
ChA, ChB: Celina	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Strawn	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

Table 7.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
CrA, CrB:					
Crosby	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, southern arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
Dr:					
Drummer	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
EmA, EmB, EmB2, EmC2:					
Eldean	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
EnC2:					
Eldean	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Casco	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
EpB2, EpC2, EpC3, EpD2, EpD3, EpE2:					
Eldean	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---

Table 7.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
EpB2, EpC2, EpC3, EpD2, EpD3, EpE2: Miamian	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
EsE3: Eldean	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Rodman	Siberian peashrub	Silky dogwood, gray dogwood, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple.	Jack pine, Virginia pine, black locust.	---	---
EuB, EuC: Eldean	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Urban land.					
Ge: Genesee	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Gn: Genesee	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.

Table 7.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Ko:					
Kokomo	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
Lg, Lh:					
Linwood	Whitebelle honeysuckle, common ninebark.	Silky dogwood, Amur privet, Amur honeysuckle, nannyberry.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.
Lm, Lp:					
Lippincott	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
Lu:					
Lippincott	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
Urban land.					
MgB2, MgC2, MgE2:					
Miamian	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
MhA, MhB, MhB2, MhC, MhC2, MhD2, MhE, MhE2:					
Miamian	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
MkB2, MkC2, MkD2:					
Miamian	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

Table 7.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
MmC3, MmD3, MmE3: Miamian	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
MnB, MnC: Miamian	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Urban land.					
Mo: Milford	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
Ms: Millsdale	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	---
MtA, MtB: Milton	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
MvC2: Milton	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---

Table 7.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
MxB:					
Milton	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Urban land.					
OcA, OcB:					
Ockley	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Pa:					
Patton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
RaA:					
Randolph	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
RgE:					
Rodman	Siberian peashrub	Silky dogwood, gray dogwood, Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple.	Jack pine, Virginia pine, black locust.	---	---
Rn, Ro:					
Ross	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
RuA:					
Rush	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

Table 7.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
ScA:					
Savona	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
So:					
Sloan	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
StB2, StC2, StD2:					
Strawn	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
SuA, SuB:					
Strawn	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Crosby	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, southern arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
ThA:					
Thackery	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Tr, Ts:					
Tremont	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.

Table 7.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Wc: Wallkill	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
WeA: Warsaw	Siberian peashrub	Washington hawthorn, autumn-olive, eastern redcedar, Amur honeysuckle, radiant crabapple, common lilac.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
WpA: Waupecan	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
WrA: Waynetown	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Wt: Westland	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.

Table 8.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. See text for definitions of terms used in this table. Absence of an entry indicates that information was not available)

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Ad: Adrian	4W	Slight	Severe	Severe	Severe	Severe	Quaking aspen	56	4	Red maple, silver maple, white ash, green ash, tamarack, eastern cottonwood, baldcypress, northern whitecedar.
							Black willow	---	---	
							Red maple	51	2	
							Silver maple	76	2	
							White ash	51	2	
Ae: Adrian	4W	Slight	Severe	Severe	Severe	Severe	Quaking aspen	56	4	Red maple, silver maple, white ash, green ash, tamarack, eastern cottonwood, baldcypress, northern whitecedar.
							Black willow	---	---	
							Red maple	51	2	
							Silver maple	76	2	
							White ash	51	2	
Ca, Cb: Carlisle	6W	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	80	6	Red maple, green ash, black willow.
							White ash	---	---	
							Black cherry	---	---	
							Swamp white oak	---	---	
							Red maple	---	---	
							Green ash	---	---	
CcD2: Casco	4R	Moderate	Moderate	Moderate	Slight	Moderate	White oak	70	4	Red pine.
							Eastern white pine	85	14	
							Jack pine	68	7	
							Red pine	78	10	
CeA, CeB: Celina	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	90	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	110	9	
							White oak	---	---	
							Sugar maple	---	---	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
ChA, ChB:										
Celina----------	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	90	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry--------	---	---	
							White ash-----------	---	---	
							Black walnut--------	---	---	
							Tuliptree-----------	110	9	
							White oak-----------	---	---	
							Sugar maple---------	---	---	
Strawn----------	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	80	4	Sugar maple, green ash, black walnut, red pine, eastern white pine, white oak, northern red oak.
							Black walnut--------	---	---	
							White oak-----------	80	4	
							Tuliptree-----------	90	6	
CrA, CrB:										
Crosby----------	5D	Slight	Moderate	Slight	Moderate	Severe	Northern red oak----	86	5	Red maple, river birch, white ash, green ash, tuliptree, eastern white pine, American sycamore, white oak, northern red oak, black oak.
							Tuliptree-----------	94	7	
							White ash-----------	87	6	
							Black oak-----------	88	5	
DoE:										
Donnelsville----	2R	Severe	Severe	Slight	Slight	Moderate	Black oak-----------	50	2	White ash, tuliptree, red pine, eastern white pine, Virginia pine, black oak.
							Black cherry--------	---	---	
							Scarlet oak---------	---	---	
							Tuliptree-----------	---	---	
							Red maple-----------	---	---	
DpF:										
Donnelsville----	2R	Severe	Severe	Slight	Slight	Moderate	Black oak-----------	50	2	White ash, tuliptree, red pine, eastern white pine, Virginia pine, black oak.
							Black cherry--------	---	---	
							Scarlet oak---------	---	---	
							Tuliptree-----------	---	---	
							Red maple-----------	---	---	
Rock outcrop.										

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
EmA, EmB, EmB2 EmC2:										
Eldean	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	4	White ash, black walnut, white oak, tuliptree, red pine, eastern white pine.
							Black cherry	---	---	
							Sugar maple	---	---	
							Black oak	80	4	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	80	4	
EnC2:										
Eldean	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	4	White ash, black walnut, white oak, tuliptree, red pine, eastern white pine.
							Black cherry	---	---	
							Sugar maple	---	---	
							Black oak	80	4	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	80	4	
Casco	4S	Slight	Moderate	Slight	Slight	Moderate	White oak	70	4	Red pine.
							Eastern white pine	85	14	
							Jack pine	68	7	
							Red pine	78	10	
EpB2, EpC2, EpC3:										
Eldean	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	4	White ash, black walnut, white oak, tuliptree, red pine, eastern white pine.
							Black cherry	---	---	
							Sugar maple	---	---	
							Black oak	80	4	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	80	4	
Miamian	5A	Slight	Slight	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
EpD2, EpD3, EpE2:										
Eldean	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak	80	4	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak.
							Black cherry	---	---	
							Sugar maple	---	---	
							Black oak	80	4	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	80	4	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
EpD2, EpD3, EpE2:										
Miamian	5R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
EsE3:										
Eldean	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak	80	4	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak.
							Black cherry	---	---	
							Sugar maple	---	---	
							Black oak	80	4	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	80	4	
Rodman	4R	Moderate	Moderate	Severe	Slight	Slight	White oak	70	4	Red pine, eastern white pine.
							Northern red oak	70	4	
							Red pine	75	10	
							Eastern white pine	85	14	
Ge, Gn:										
Genesee	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	90	5	Black walnut, tuliptree, eastern white pine.
							Tuliptree	100	8	
Ko:										
Kokomo	4W	Slight	Severe	Severe	Severe	Severe	Northern red oak	75	4	Red maple, river birch, green ash, Norway spruce, American sycamore, eastern cottonwood, swamp white oak, bur oak, pin oak.
							White oak	75	4	
							Sweetgum	90	7	
							Pin oak	85	5	
Lg, Lh:										
Linwood	2W	Slight	Severe	Severe	Severe	Severe	Red maple	46	2	Red maple, green ash, sweetgum, American sycamore, eastern cottonwood, swamp white oak, pin oak, baldcypress.
							Green ash	---	---	
							American sycamore	---	---	
							Eastern cottonwood	---	---	
							Pin oak	---	---	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
Lm, Lp:										
Lippincott	4W	Slight	Severe	Severe	Severe	Severe	Northern red oak	80	4	Red maple, silver maple, green ash, sweetgum, American sycamore, eastern cottonwood, swamp white oak, pin oak, baldcypress.
							Black cherry	---	---	
							Black oak	80	4	
							Red maple	---	---	
							Green ash	---	---	
							Eastern cottonwood	---	---	
							Swamp white oak	85	5	
							Pin oak	88	5	
MgB2, MgC2, MgE2:										
Miamian	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	87	5	White ash black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
MhA, MhB, MhB2, MhC, MhC2:										
Miamian	5A	Slight	Slight	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
MhD2, MhE, MhE2:										
Miamian	5R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
MkB2, MkC2:										
Miamian	5A	Slight	Slight	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
MkD2:										
Miamian	5R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
MmC3:										
Miamian	5A	Slight	Slight	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
MmD3, MmE3:										
Miamian	5R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak	87	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	---	---	
							White oak	---	---	
							Sugar maple	---	---	
Ms:										
Millsdale	5W	Slight	Severe	Severe	Severe	Severe	Pin oak	86	5	Red maple, green ash, sweetgum, American sycamore, eastern cottonwood, swamp white oak, pin oak, baldcypress.
							Red maple	---	---	
							Green ash	---	---	
							Eastern cottonwood	---	---	
							Swamp white oak	---	---	
							Black cherry	---	---	
MtA, MtB:										
Milton	4D	Slight	Slight	Slight	Moderate	Moderate	Northern red oak	80	4	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	95	7	
							White oak	---	---	
							Sugar maple	---	---	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
MvC2:										
Milton	4D	Slight	Slight	Slight	Moderate	Moderate	Northern red oak	80	4	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry	---	---	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	95	7	
							White oak	---	---	
							Sugar maple	---	---	
OcA, OcB:										
Ockley	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	90	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak, black oak, black locust.
							White ash	---	---	
							Tuliptree	100	8	
							White oak	90	5	
							Sweetgum	76	5	
Pa:										
Patton	4W	Slight	Severe	Moderate	Moderate	Severe	Northern red oak	75	4	Red maple, white ash, sweetgum, Norway spruce, eastern white pine, pin oak, baldcypress.
							White oak	75	4	
							Sweetgum	80	6	
							Pin oak	85	5	
RaA:										
Randolph	4A	Slight	Slight	Slight	Slight	Severe	Northern red oak	75	4	Tuliptree, eastern white pine.
							Sugar maple	90	4	
							Tuliptree	85	6	
RgE:										
Rodman	4R	Moderate	Moderate	Severe	Slight	Slight	Northern red oak	75	4	Jack pine, red pine, eastern white pine.
							White oak	75	4	
							Red pine	75	10	
							Eastern white pine	85	14	
Rn, Ro:										
Ross	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	86	5	White ash, black walnut, tuliptree, Norway spruce, eastern white pine.
							Black cherry	---	---	
							White oak	---	---	
							Sugar maple	85	4	
							White ash	---	---	
							Black walnut	---	---	
							Tuliptree	96	7	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	Trees to plant
RuA:										
Rush	5A	Slight	Slight	Slight	Slight	Severe	Northern red oak	90	5	White ash, black walnut, tuliptree, red pine, eastern white pine, black locust.
							White oak	90	5	
							Sweetgum	---	---	
							Tuliptree	98	7	
ScA:										
Savona	4A	Slight	Slight	Slight	Slight	Severe	Pin oak	80	4	White ash, green ash, tuliptree, red pine, eastern white pine, American sycamore, black cherry, white oak, northern red oak, black locust.
							Sugar maple	---	---	
							White ash	---	---	
							Tuliptree	---	---	
							Black cherry	---	---	
							White oak	---	---	
							Northern red oak	---	---	
So:										
Sloan	5W	Slight	Severe	Moderate	Moderate	Severe	Pin oak	86	5	Red maple, silver maple, green ash, sweetgum, American sycamore, eastern cottonwood, swamp white oak, pin oak.
							Green ash	---	---	
							Eastern cottonwood	---	---	
							Swamp white oak	---	---	
							Red maple	---	---	
StB2, StC2:										
Strawn	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	4	Sugar maple, green ash, black walnut, red pine, eastern white pine, white oak, northern red oak.
							Black walnut	---	---	
							White oak	80	4	
							Tuliptree	90	6	
StD2, StE2:										
Strawn	4R	Moderate	Moderate	Moderate	Slight	Moderate	Northern red oak	80	4	Sugar maple, green ash, black walnut, red pine, eastern white pine, white oak, northern red oak.
							Black walnut	---	---	
							White oak	80	4	
							Tuliptree	90	6	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
SuA, SuB:										
Strawn----------	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	80	4	Sugar maple, green ash, black walnut, red pine, eastern white pine, white oak, northern red oak.
							Black walnut--------	---	---	
							White oak-----------	80	4	
							Tuliptree-----------	90	6	
Crosby----------	5D	Slight	Moderate	Slight	Moderate	Severe	Northern red oak----	86	5	Red maple, river birch, white ash, green ash, tuliptree, eastern white pine, American sycamore, white oak, northern red oak, black oak.
							Tuliptree-----------	94	7	
							White ash-----------	87	6	
							Black oak-----------	88	5	
ThA:										
Thackery--------	5A	Slight	Slight	Slight	Slight	Severe	Northern red oak----	90	5	White ash, green ash, black walnut, tuliptree, red pine, eastern white pine, black cherry, white oak, northern red oak, black locust.
							White ash-----------	---	---	
							Black walnut--------	---	---	
							Tuliptree-----------	---	---	
							Black cherry--------	---	---	
							White oak-----------	90	5	
							Sugar maple---------	---	---	
Tr, Ts:										
Tremont---------	5A	Slight	Slight	Slight	Slight	Severe	Northern red oak----	86	5	White ash, black walnut, tuliptree, red pine, eastern white pine, white oak, northern red oak.
							Black cherry--------	---	---	
							White ash-----------	---	---	
							Black walnut--------	---	---	
							Tuliptree-----------	96	7	
							White oak-----------	---	---	
							Sugar maple---------	---	---	
Wc:										
Wallkill--------	2W	Slight	Severe	Severe	Severe	Severe	Silver maple--------	70	2	---
							Black willow--------	---	---	
WrA:										
Waynetown-------	5A	Slight	Slight	Slight	Slight	Moderate	Pin oak-------------	85	5	Red maple, white ash, tuliptree, eastern white pine, American sycamore.
							White oak-----------	75	4	
							Sweetgum------------	80	6	
							Tuliptree-----------	85	6	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
Wt:										
Westland--------	5W	Slight	Severe	Severe	Severe	Severe	Pin oak-------------	85	5	Red maple, white ash, green ash, sweetgum, American sycamore, eastern cottonwood, swamp white oak, bur oak, pin oak, baldcypress.
							Sweetgum------------	90	7	
							White oak-----------	75	4	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

Table 9.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of entry indicates that no rating is applicable)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ad, Ae:					
Adrian	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Ca, Cb:					
Carlisle	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
CcD2:					
Casco	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.
CeA:					
Celina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
CeB:					
Celina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
ChA:					
Celina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
Strawn	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
ChB:					
Celina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
Strawn	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
CrA, CrB:					
Crosby	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
DoE:					
Donnelsville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DpF:					
Donnelsville	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.					
Dr:					
Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
EmA:					
Eldean	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: small stones, percs slowly.	Severe: erodes easily.	Moderate: droughty.
EmB, EmB2:					
Eldean	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: erodes easily.	Moderate: droughty.
EmC2:					
Eldean	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: droughty, slope.
EnC2:					
Eldean	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: droughty, slope.
Casco	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Severe: droughty.
EpB2:					
Eldean	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Moderate: droughty.
Miamian	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight	Slight.
EpC2, EpC3:					
Eldean	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: droughty, slope.
Miamian	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
EpD2, EpD3:					
Eldean	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
EpE2:					
Eldean----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Miamian---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
EsE3:					
Eldean----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Rodman----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.
EuB:					
Eldean----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: erodes easily.	Moderate: droughty.
Urban land.					
EuC:					
Eldean----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: droughty, slope.
Urban land.					
Ge, Gn:					
Genesee---------	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Ko:					
Kokomo----------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Lg:					
Linwood---------	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Lh:					
Linwood---------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Lm, Lp:					
Lippincott------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Lu:					
Lippincott------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Urban land.					
MgB2:					
Miamian---------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight------------	Slight.

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MgC2, MgE2:					
Miamian	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MhA:					
Miamian	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
MhB, MhB2:					
Miamian	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
MhC, MhC2:					
Miamian	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MhD2, MhE, MhE2:					
Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MkB2:					
Miamian	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight	Slight.
MkC2:					
Miamian	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MkD2:					
Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MmC3:					
Miamian	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MmD3, MmE3:					
Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MnB:					
Miamian	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
Urban land.					
MnC:					
Miamian	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Urban land.					
Mo:					
Milford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ms: Millsdale	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MtA: Milton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Moderate: thin layer, area reclaim.
MtB: Milton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, thin layer, area reclaim.	Slight	Moderate: thin layer, area reclaim.
MvC2: Milton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer, area reclaim.
MxB: Milton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, thin layer, area reclaim.	Slight	Moderate: thin layer, area reclaim.
Urban land.					
OcA: Ockley	Slight	Slight	Moderate: small stones.	Slight	Slight.
OcB: Ockley	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Pa: Patton	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Pg: Pits, gravel.					
Ph: Pits, quarry.					
RaA: Randolph	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, thin layer, area reclaim.
RgE: Rodman	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
Rn: Ross	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ro:					
Ross	Severe: flooding.	Slight	Slight	Slight	Slight.
RuA:					
Rush	Slight	Slight	Slight	Slight	Slight.
ScA:					
Savona	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
So:					
Sloan	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
StB2:					
Strawn	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
StC2:					
Strawn	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
StD2, StE2:					
Strawn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
SuA, SuB:					
Strawn	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
Crosby	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
ThA:					
Thackery	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
Tr:					
Tremont	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Ts:					
Tremont	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Ud:					
Udorthents	Slight	Slight	Slight	Slight	Slight.
Ur:					
Urban land.					

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Wc:					
Wallkill	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, flooding.
WeA:					
Warsaw	Slight	Slight	Moderate: small stones.	Slight	Slight.
WpA:					
Waupecan	Slight	Slight	Slight	Slight	Slight.
WrA:					
Waynetown	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Wt:					
Westland	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 10.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Ad, Ae:										
Adrian	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ca, Cb:										
Carlisle	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
CcD2:										
Casco	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CeA:										
Celina	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
CeB:										
Celina	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ChA:										
Celina	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Strawn	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ChB:										
Celina	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Strawn	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CrA:										
Crosby	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
CrB:										
Crosby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DoE:										
Donnelsville	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Fair.
DpF:										
Donnelsville	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Fair.
Rock outcrop.										
Dr:										
Drummer	Fair	Fair	Good	Fair	Fair	Good	Good	Fair	Fair	Good.
EmA, EmB, EmB2:										
Eldean	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EmC2:										
Eldean	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
EnC2:										
Eldean	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Casco	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
EpB2:										
Eldean	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Miamian	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EpC2, EpC3:										
Eldean	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Miamian	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
EpD2, EpD3, EpE2:										
Eldean	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Miamian	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EsE3:										
Eldean	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rodman	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
EuB:										
Eldean	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
EuC:										
Eldean	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
Ge, Gn:										
Genesee	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Ko:										
Kokomo	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Lg, Lh:										
Linwood	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Lm, Lp:										
Lippincott	Poor	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Lu:										
Lippincott------	Poor	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Urban land.										
MgB2:										
Miamian---------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MgC2, MgE2:										
Miamian---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MhA:										
Miamian---------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MhB, MhB2:										
Miamian---------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MhC, MhC2:										
Miamian---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MhD2, MhE, MhE2:										
Miamian---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MkB2:										
Miamian---------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MkC2:										
Miamian---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MkD2:										
Miamian---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MmC3:										
Miamian---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MmD3, MmE3:										
Miamian---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MnB:										
Miamian---------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
MnC:										
Miamian---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Mo:										
Milford----------	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ms:										
Millsdale--------	Fair	Fair	Fair	Fair	Poor	Good	Fair	Fair	Fair	Fair.
MtA, MtB:										
Milton-----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
MvC2:										
Milton-----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MxB:										
Milton-----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Urban land.										
OcA, OcB:										
Ockley-----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pa:										
Patton-----------	Good	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
Pg:										
Pits, gravel.										
Ph:										
Pits, quarry.										
RaA:										
Randolph---------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RgE:										
Rodman-----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rn, Ro:										
Ross-------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RuA:										
Rush-------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ScA:										
Savona-----------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
So:										
Sloan------------	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
StB2, StC2:										
Strawn-----------	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
StD2:										
Strawn-----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
StE2:										
Strawn----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SuA:										
Strawn----------	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Crosby----------	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SuB:										
Strawn----------	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Crosby----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ThA:										
Thackery--------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Tr, Ts:										
Tremont---------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ud:										
Udorthents------	Poor	Poor	Fair	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
Ur:										
Urban land.										
Wc:										
Wallkill--------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
WeA:										
Warsaw----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WpA:										
Waupecan--------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WrA:										
Waynetown-------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Wt:										
Westland--------	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

Table 11.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ad, Ae:						
Adrian	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Ca, Cb:						
Carlisle	Severe: excess humus, ponding.	Severe: ponding, low strength, subsides.	Severe: ponding, low strength, subsides.	Severe: ponding, low strength, subsides.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
CcD2:						
Casco	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
CeA:						
Celina	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
CeB:						
Celina	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
ChA:						
Celina	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
Strawn	Slight	Slight	Slight	Slight	Moderate: low strength, frost action.	Slight.
ChB:						
Celina	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
Strawn	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
CrA, CrB:						
Crosby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
DoE:						
Donnelsville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DpF:						
Donnelsville----	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, slope.
Rock outcrop.						
Dr:						
Drummer---------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
EmA:						
Eldean----------	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength.	Moderate: droughty.
EmB, EmB2:						
Eldean----------	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: droughty.
EmC2:						
Eldean----------	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: droughty, slope.
EnC2:						
Eldean----------	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: droughty, slope.
Casco-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
EpB2:						
Eldean----------	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: droughty.
Miamian---------	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
EpC2, EpC3:						
Eldean----------	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: droughty, slope.
Miamian---------	Moderate: too clayey, dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
EpD2, EpD3, EpE2:						
Eldean----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Miamian---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EsE3:						
Eldean	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rodman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
EuB:						
Eldean	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: droughty.
Urban land.						
EuC:						
Eldean	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: droughty, slope.
Urban land.						
Ge, Gn:						
Genesee	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ko:						
Kokomo	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Lg:						
Linwood	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Lh:						
Linwood	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding.
Lm, Lp:						
Lippincott	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
Lu:						
Lippincott	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
Urban land.						
MgB2:						
Miamian	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MgC2, MgE2:						
Miamian---------	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MhA:						
Miamian---------	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength.	Slight.
MhB, MhB2:						
Miamian---------	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
MhC, MhC2:						
Miamian---------	Moderate: too clayey, dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MhD2, MhE, MhE2:						
Miamian---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MkB2:						
Miamian---------	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
MkC2:						
Miamian---------	Moderate: too clayey, dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MkD2:						
Miamian---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MmC3:						
Miamian---------	Moderate: too clayey, dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MmD3, MmE3:						
Miamian---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MnB:						
Miamian---------	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Urban land.						

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MnC:						
Miamian	Moderate: too clayey, dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Urban land.						
Mo:						
Milford	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Ms:						
Millsdale	Severe: depth to rock, ponding.	Severe: ponding, shrink-swell.	Severe: ponding, depth to rock, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
MtA:						
Milton	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: low strength.	Moderate: thin layer, area reclaim.
MtB:						
Milton	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: thin layer, area reclaim.
MvC2:						
Milton	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer, area reclaim.
MxB:						
Milton	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: thin layer, area reclaim.
Urban land.						
OcA:						
Ockley	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
OcB:						
Ockley	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Pa:						
Patton	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Pg:						
Pits, gravel.						

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ph:						
Pits, quarry.						
RaA:						
Randolph	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness, thin layer, area reclaim.
RgE:						
Rodman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Rn:						
Ross	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Ro:						
Ross	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, frost action.	Slight.
RuA:						
Rush	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
ScA:						
Savona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
So:						
Sloan	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
StB2:						
Strawn	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
StC2:						
Strawn	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
StD2, StE2:						
Strawn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SuA:						
Strawn	Slight	Slight	Slight	Slight	Moderate: low strength, frost action.	Slight.

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SuA:						
Crosby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
SuB:						
Strawn	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
Crosby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
ThA:						
Thackery	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.	Slight.
Tr:						
Tremont	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, frost action.	Moderate: wetness.
Ts:						
Tremont	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
Ud:						
Udorthents	Slight	Slight	Slight	Slight	Moderate: frost action.	Slight.
Ur:						
Urban land.						
Wc:						
Wallkill	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness, low strength.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
WeA:						
Warsaw	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
WpA:						
Waupecan	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
WrA:						
Waynetown	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Wt:						
Westland--------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.

Table 12.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ad, Ae:					
Adrian	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Ca, Cb:					
Carlisle	Severe: ponding, percs slowly, subsides.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
CcD2:					
Casco	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
CeA, CeB:					
Celina	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
ChA, ChB:					
Celina	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
Strawn	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
CrA:					
Crosby	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Poor: wetness.
CrB:					
Crosby	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
DoE:					
Donnelsville	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
DpF:					
Donnelsville	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Rock outcrop.					

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Dr:					
Drummer----------	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
EmA, EmB, EmB2:					
Eldean----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
EmC2:					
Eldean----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
EnC2:					
Eldean----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Casco-----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
EpB2:					
Eldean----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Miamian---------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey, small stones.
EpC2, EpC3:					
Eldean----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Miamian---------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
EpD2, EpD3, EpE2:					
Eldean----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Miamian---------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EsE3:					
Eldean----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Rodman----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
EuB:					
Eldean----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Urban land.					
EuC:					
Eldean----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Urban land.					
Ge, Gn:					
Genesee---------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness, thin layer.
Ko:					
Kokomo----------	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
Lg, Lh:					
Linwood---------	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding.	Severe: seepage, ponding.	Poor: ponding.
Lm:					
Lippincott------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too clayey.	Severe: seepage, ponding.	Poor: too clayey, hard to pack, ponding.
Lp:					
Lippincott------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: small stones, ponding, too clayey.
Lu:					
Lippincott------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: small stones, ponding, too clayey.
Urban land.					

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MgB2:					
Miamian---------	Severe: percs slowly.	Moderate: depth to rock, seepage, slope.	Severe: depth to rock, seepage.	Slight-----------	Poor: too clayey.
MgC2, MgE2:					
Miamian---------	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, seepage.	Moderate: slope.	Poor: too clayey.
MhA:					
Miamian---------	Severe: percs slowly.	Slight-----------	Moderate: too clayey.	Slight-----------	Fair: too clayey, small stones.
MhB, MhB2:					
Miamian---------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey, small stones.
MhC, MhC2:					
Miamian---------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
MhD2, MhE, MhE2:					
Miamian---------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MkB2:					
Miamian---------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey, small stones.
MkC2:					
Miamian---------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
MkD2:					
Miamian---------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MmC3:					
Miamian---------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
MmD3, MmE3:					
Miamian---------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MnB:					
Miamian	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
Urban land.					
MnC:					
Miamian	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
Urban land.					
Mo:					
Milford	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Ms:					
Millsdale	Severe: depth to rock, ponding, percs slowly.	Severe: depth to rock, ponding.	Severe: depth to rock, ponding, too clayey.	Severe: depth to rock, ponding.	Poor: depth to rock, too clayey, hard to pack.
MtA, MtB:					
Milton	Severe: thin layer, seepage, percs slowly.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Moderate: seepage.	Poor: area reclaim, too clayey.
MvC2:					
Milton	Severe: thin layer, seepage, percs slowly.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage.	Moderate: seepage, slope.	Poor: area reclaim, too clayey.
MxB:					
Milton	Severe: thin layer, seepage, percs slowly.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Moderate: seepage.	Poor: area reclaim, too clayey.
Urban land.					
OcA, OcB:					
Ockley	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Pa:					
Patton	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
Pg:					
Pits, gravel.					
Ph:					
Pits, quarry.					

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RaA:					
Randolph	Severe: thin layer, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: wetness.	Poor: area reclaim, too clayey, hard to pack.
RgE:					
Rodman	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Rn:					
Ross	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
Ro:					
Ross	Moderate: flooding, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Good.
RuA:					
Rush	Slight	Moderate: seepage.	Severe: seepage.	Slight	Fair: too clayey.
ScA:					
Savona	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness, hard to pack.
So:					
Sloan	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
StB2:					
Strawn	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
StC2:					
Strawn	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
StD2, StE2:					
Strawn	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
SuA:					
Strawn	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
Crosby	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Poor: wetness.

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SuB:					
Strawn	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
Crosby	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
ThA:					
Thackery	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, small stones, wetness.
Tr:					
Tremont	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, wetness, thin layer.
Ts:					
Tremont	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness, thin layer.
Ud:					
Udorthents	Slight	Slight	Slight	Slight	Poor: thin layer.
Ur:					
Urban land.					
Wc:					
Wallkill	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
WeA:					
Warsaw	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
WpA:					
Waupecan	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
WrA:					
Waynetown	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Wt:					
Westland--------	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: small stones, ponding.

Table 13.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Ad, Ae:				
Adrian	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Ca, Cb:				
Carlisle	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
CcD2:				
Casco	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
CeA, CeB:				
Celina	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
ChA, ChB:				
Celina	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Strawn	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
CrA, CrB:				
Crosby	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
DoE:				
Donnelsville	Fair: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
DpF:				
Donnelsville	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Rock outcrop.				
Dr:				
Drummer	Poor: wetness.	Probable	Probable	Poor: wetness.
EmA, EmB, EmB2, EmC2:				
Eldean	Good	Probable	Probable	Poor: small stones, area reclaim.

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
EnC2:				
Eldean	Good	Probable	Probable	Poor: small stones, area reclaim.
Casco	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
EpB2, EpC2, EpC3:				
Eldean	Good	Probable	Probable	Poor: small stones, area reclaim.
Miamian	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
EpD2, EpD3, EpE2:				
Eldean	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Miamian	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
EsE3:				
Eldean	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Rodman	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
EuB, EuC:				
Eldean	Good	Probable	Probable	Poor: small stones, area reclaim.
Urban land.				
Ge, Gn:				
Genesee	Good	Probable	Probable	Good.
Ko:				
Kokomo	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Lg, Lh:				
Linwood	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
Lm:				
Lippincott	Poor: wetness.	Probable	Probable	Poor: too clayey, small stones, area reclaim.

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Lp:				
Lippincott	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
Lu:				
Lippincott	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
Urban land.				
MgB2, MgC2, MgE2:				
Miamian	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MhA, MhB, MhB2, MhC, MhC2:				
Miamian	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MhD2, MhE, MhE2:				
Miamian	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
MkB2, MkC2:				
Miamian	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MkD2:				
Miamian	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
MmC3:				
Miamian	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MmD3, MmE3:				
Miamian	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
MnB, MnC:				
Miamian	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
Mo:				
Milford	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ms:				
Millsdale	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MtA, MtB, MvC2:				
Milton	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
MxB:				
Milton	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Urban land.				
OcA, OcB:				
Ockley	Good	Probable	Probable	Poor: small stones, area reclaim.
Pa:				
Patton	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pg:				
Pits, gravel.				
Ph:				
Pits, quarry.				
RaA:				
Randolph	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
RgE:				
Rodman	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Rn, Ro:				
Ross	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
RuA:				
Rush	Good	Probable	Probable	Poor: area reclaim.
ScA:				
Savona	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
So:				
Sloan	Poor: wetness.	Probable	Probable	Poor: area reclaim, wetness.
StB2, StC2:				
Strawn	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
StD2, StE2:				
Strawn	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
SuA, SuB:				
Strawn	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Crosby	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
ThA:				
Thackery	Fair: wetness.	Probable	Probable	Poor: area reclaim.
Tr, Ts:				
Tremont	Fair: wetness.	Probable	Probable	Fair: small stones, area reclaim.
Ud:				
Udorthents	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Ur: Urban land.				
Wc:				
Wallkill	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
WeA:				
Warsaw	Good	Probable	Probable	Poor: small stones, area reclaim.
WpA:				
Waupecan	Good	Probable	Probable	Poor: area reclaim.
WrA:				
Waynetown	Poor: wetness.	Probable	Probable	Poor: wetness.
Wt:				
Westland	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.

Table 14.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ad, Ae:							
Adrian----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, soil blowing, rooting depth.	Ponding, too sandy, soil blowing.	Wetness, rooting depth.
Ca, Cb:							
Carlisle--------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
CcD2:							
Casco-----------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, large stones, too sandy.	Large stones, slope, droughty.
CeA:							
Celina----------	Slight---------	Severe: piping.	Severe: no water.	Frost action---	Wetness--------	Erodes easily, wetness.	Erodes easily, rooting depth.
CeB:							
Celina----------	Moderate: slope.	Severe: piping.	Severe: no water.	Frost action, slope.	Wetness, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
ChA:							
Celina----------	Slight---------	Severe: piping.	Severe: no water.	Frost action---	Wetness--------	Erodes easily, wetness.	Erodes easily, rooting depth.
Strawn----------	Moderate: seepage.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
ChB:							
Celina----------	Moderate: slope.	Severe: piping.	Severe: no water.	Frost action, slope.	Wetness, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Strawn----------	Moderate: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
CrA:							
Crosby----------	Moderate: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CrB:							
Crosby	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Wetness, erodes easily.
DoE:							
Donnelsville	Severe: seepage, slope.	Severe: seepage, piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
DpF:							
Donnelsville	Severe: seepage, slope.	Severe: seepage, piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.							
Dr:							
Drummer	Moderate: seepage.	Severe: ponding.	Moderate: slow refill, cutbanks cave.	Ponding, frost action.	Ponding	Ponding	Wetness.
EmA:							
Eldean	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, erodes easily.	Erodes easily, too sandy.	Erodes easily, droughty.
EmB, EmB2:							
Eldean	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, erodes easily.	Erodes easily, too sandy.	Erodes easily, droughty.
EmC2:							
Eldean	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, erodes easily.	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
EnC2:							
Eldean	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
Casco	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, soil blowing.	Slope, large stones, too sandy.	Large stones, slope, droughty.

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EpB2:							
Eldean	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Erodes easily, too sandy.	Erodes easily, droughty.
Miamian	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Erodes easily	Erodes easily, rooting depth.
EpC2, EpC3, EpD2, EpD3:							
Eldean	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
Miamian	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
EpE2:							
Eldean	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, erodes easily.	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
Miamian	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
EsE3:							
Eldean	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, erodes easily.	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
Rodman	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
EuB:							
Eldean	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, erodes easily.	Erodes easily, too sandy.	Erodes easily, droughty.
Urban land.							

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EuC:							
Eldean	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, erodes easily.	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
Urban land.							
Ge, Gn:							
Genesee	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill, cutbanks cave.	Deep to water	Flooding	Favorable	Favorable.
Ko:							
Kokomo	Slight	Severe: ponding.	Severe: slow refill.	Ponding, frost action.	Ponding, percs slowly.	Ponding	Wetness.
Lg:							
Linwood	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing, rooting depth.	Large stones, ponding.	Large stones, wetness, rooting depth.
Lh:							
Linwood	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, rooting depth.	Ponding	Wetness, rooting depth.
Lm:							
Lippincott	Severe: seepage.	Severe: hard to pack, ponding.	Severe: cutbanks cave.	Ponding	Ponding, rooting depth.	Ponding	Wetness, rooting depth.
Lp:							
Lippincott	Severe: seepage.	Severe: seepage, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding	Ponding	Wetness.
Lu:							
Lippincott	Severe: seepage.	Severe: seepage, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding	Ponding	Wetness.
Urban land.							

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
MgB2:							
Miamian----------	Moderate: depth to rock, seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Erodes easily	Erodes easily, rooting depth.
MgC2, MgE2:							
Miamian----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
MhA:							
Miamian----------	Slight----------	Severe: piping.	Severe: no water.	Deep to water	Rooting depth, erodes easily.	Erodes easily	Erodes easily, rooting depth.
MhB, MhB2:							
Miamian----------	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Erodes easily	Erodes easily, rooting depth.
MhC, MhC2, MhD2, MhE, MhE2:							
Miamian--------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
MkB2:							
Miamian----------	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Erodes easily	Erodes easily, rooting depth.
MkC2, MkD2, MmC3, MmD3, MmE3:							
Miamian--------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
MnB:							
Miamian----------	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Erodes easily	Erodes easily, rooting depth.
Urban land.							

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
MnC:							
Miamian----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
Urban land.							
Mo:							
Milford----------	Moderate: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, frost action.	Ponding---------	Ponding---------	Wetness.
Ms:							
Millsdale--------	Moderate: depth to rock.	Severe: ponding.	Severe: no water.	Ponding, depth to rock, frost action.	Ponding, depth to rock.	Depth to rock, ponding.	Wetness, depth to rock.
MtA:							
Milton-----------	Moderate: seepage, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Thin layer, erodes easily.	Depth to rock, area reclaim.	Erodes easily, depth to rock.
MtB:							
Milton-----------	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, thin layer, erodes easily.	Depth to rock, area reclaim.	Erodes easily, depth to rock.
MvC2:							
Milton-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, thin layer, erodes easily.	Slope, depth to rock, area reclaim.	Slope, erodes easily, depth to rock.
MxB:							
Milton-----------	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, thin layer, erodes easily.	Depth to rock, area reclaim.	Erodes easily, depth to rock.
Urban land.							
OcA:							
Ockley-----------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Favorable-------	Favorable-------	Favorable.

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
OcB:							
Ockley	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
Pa:							
Patton	Moderate: seepage.	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, frost action.	Ponding	Erodes easily, ponding.	Wetness, erodes easily.
Pg: Pits, gravel.							
Ph: Pits, quarry.							
RaA:							
Randolph	Moderate: depth to rock, seepage.	Severe: thin layer.	Severe: no water.	Thin layer, frost action.	Wetness, thin layer.	Depth to rock, area reclaim, erodes easily.	Wetness, erodes easily, depth to rock.
RgE:							
Rodman	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Rn:							
Ross	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Flooding	Favorable	Favorable.
Ro:							
Ross	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Favorable	Favorable	Favorable.
RuA:							
Rush	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
ScA:							
Savona	Severe: seepage.	Severe: wetness, thin layer.	Severe: slow refill, cutbanks cave.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
So: Sloan	Severe: seepage.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
StB2: Strawn	Moderate: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
StC2, StD2, StE2: Strawn	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
SuA: Strawn	Moderate: seepage.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Crosby	Moderate: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
SuB: Strawn	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Crosby	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Wetness, erodes easily.
ThA: Thackery	Severe: seepage.	Moderate: thin layer, piping, wetness.	Severe: cutbanks cave.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
Tr: Tremont	Severe: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Frost action	Wetness	Wetness	Favorable.
Ts: Tremont	Severe: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Wetness	Favorable.

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ud:							
Udorthents	Slight	Slight	Severe: no water.	Deep to water	Favorable	Favorable	Favorable.
Ur:							
Urban land.							
Wc:							
Wallkill	Severe: seepage.	Severe: excess humus, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
WeA:							
Warsaw	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Favorable	Too sandy	Favorable.
WpA:							
Waupecan	Severe: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Rooting depth	Erodes easily	Erodes easily, rooting depth.
WrA:							
Waynetown	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
Wt:							
Westland	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, frost action.	Ponding	Ponding	Wetness.

Table 15.--Engineering Index Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Ad:												
Adrian----------	0-22	Muck-----------	PT	A-8	0	0	0	0	0	0	---	NP
	22-80	Very gravelly sandy loam, very gravelly loamy sand.	SP, SM	A-2, A-3, A-1	0	0	80-100	55-100	35-75	0-30	0-14	NP
Ae:												
Adrian----------	0-36	Muck-----------	PT	A-8	0	0	0	0	0	0	---	NP
	36-80	Very gravelly sandy loam, very gravelly loamy sand.	SP, SM	A-2, A-3, A-1	0	0	80-100	55-100	35-75	0-30	0-14	NP
Ca, Cb:												
Carlisle--------	0-80	Muck-----------	PT	A-8	0	0	0	0	0	0	---	NP
CcD2:												
Casco-----------	0-7	Gravelly loam	SM, SC-SM	A-2, A-1	0	0-9	55-90	50-75	30-60	15-50	0-20	2-7
	7-17	Clay loam, sandy clay loam, gravelly loam.	SC, CL, GC	A-6, A-7, A-2	0-1	0-9	55-100	50-100	40-90	20-80	25-46	11-26
	17-80	Stratified loamy sand to gravel.	GP, SP, GP-GM, SP-SM	A-1, A-3, A-2	0-3	0-30	25-100	20-95	10-75	2-10	0-14	NP
CeA:												
Celina----------	0-9	Silt loam------	ML	A-4	0	0	100	90-100	90-100	70-85	26-40	3-10
	9-30	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	0	100	90-100	80-95	70-85	32-48	12-28
	30-80	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	75-95	75-90	65-90	50-80	20-36	4-16
CeB:												
Celina----------	0-8	Silt loam------	ML	A-4	0	0	100	90-100	90-100	70-85	26-40	3-10
	8-27	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	0	100	90-100	80-95	70-85	32-48	12-28
	27-80	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	75-95	75-90	65-90	50-80	20-36	4-16

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
ChA:												
Celina----------	0-10	Silt loam------	ML	A-4	0	0	100	90-100	90-100	70-85	26-40	3-10
	10-30	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	0	100	90-100	80-95	70-85	32-48	12-28
	30-80	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	75-95	75-90	65-90	50-80	20-36	4-16
Strawn----------	0-10	Silt loam------	CL, ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	90-100	20-40	3-20
	10-23	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-23
	23-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-18
ChB:												
Celina----------	0-10	Silt loam------	ML	A-4	0	0	100	90-100	90-100	70-85	26-40	3-10
	10-30	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	0	100	90-100	80-95	70-85	32-48	12-28
	30-80	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	75-95	75-90	65-90	50-80	20-36	4-16
Strawn----------	0-10	Silty clay loam	CL	A-6, A-7	0	0	90-100	90-100	80-95	80-95	30-45	10-25
	10-23	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-25
	23-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-20
CrA:												
Crosby----------	0-9	Silt loam------	CL, ML, CL-ML	A-4, A-6	0	0	95-100	90-100	80-95	60-85	15-40	NP-15
	9-25	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7-6	0-1	0-3	90-100	85-100	75-95	55-90	30-60	10-35
	25-80	Loam, fine sandy loam.	CL, SM, ML, SC	A-4, A-6	0-1	0-3	85-100	80-98	65-90	40-70	15-30	NP-15

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CrB:												
Crosby----------	0-9	Silt loam------	CL, ML, CL-ML	A-4, A-6	0	0	95-100	90-100	80-95	60-85	15-40	NP-15
	9-35	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7-6	0-1	0-3	90-100	85-100	75-95	55-90	30-60	10-35
	35-80	Loam, fine sandy loam.	CL, SM, ML, SC	A-4, A-6	0-1	0-3	85-100	80-98	65-90	40-70	15-30	NP-15
DoE:												
Donnelsville----	0-21	Channery silt loam.	ML, SM, SC-SM	A-4	0-10	5-15	70-85	55-75	50-65	40-55	0-35	NP-7
	21-36	Very channery loam, extremely channery loam, very channery silt loam.	ML, SM, GM	A-4, A-2	10-40	10-65	60-95	40-90	35-80	30-70	0-35	NP-7
	36-47	Extremely channery loam, extremely flaggy loam, extremely stony silt loam.	ML, GM, GM-GC	A-4, A-1-b, A-2-4	15-30	15-70	40-75	25-80	20-80	15-65	0-35	NP-7
	47-50	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
DpF:												
Donnelsville----	0-14	Very channery loam.	SM, GM, GM-GC	A-4, A-2-4	5-15	10-25	55-75	35-55	30-50	25-40	0-35	NP-7
	14-30	Very channery loam, extremely channery loam, extremely flaggy silt loam.	ML, SM, GM	A-4, A-2	10-40	10-65	60-95	40-90	35-80	30-70	0-35	NP-7
	30-55	Extremely channery loam, extremely flaggy loam, extremely stony silt loam.	ML, GM, GM-GC	A-4, A-1-b, A-2-4	15-30	15-70	40-75	25-80	20-80	15-65	0-35	NP-7
	55-58	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
DpF:												
Rock outcrop.												
Dr:												
Drummer----------	0-15	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	80-100	30-50	15-30
	15-42	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	80-100	30-50	15-30
	42-47	Clay loam, silt loam.	CL	A-6, A-7	0	0	100	95-100	85-100	50-80	30-50	15-30
	47-80	Sand, gravelly loamy sand, very gravelly sand.	GM, GW-GM, SW-SM, SM	A-1	0	0-5	40-95	30-90	30-50	5-15	0-14	NP
EmA:												
Eldean-----------	0-10	Silt loam-------	ML, CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-40	4-14
	10-31	Clay, clay loam, gravelly clay.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	31-38	Very gravelly loam, loam, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	38-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
EmB:												
Eldean-----------	0-10	Silt loam-------	ML, CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-40	4-14
	10-31	Gravelly clay, silty clay loam, very gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	31-38	Very gravelly clay loam, loam, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	38-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EmB2:												
Eldean----------	0-8	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-40	4-14
	8-18	Clay, sandy clay, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	18-24	Very gravelly loam, loam, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	24-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
EmC2:												
Eldean----------	0-9	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-40	4-14
	9-22	Clay, sandy clay, clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	22-28	Very gravelly clay, clay, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	28-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
EnC2:												
Eldean----------	0-7	Clay loam------	CL	A-6, A-4	0	0-5	85-100	75-100	65-100	55-80	25-40	9-18
	7-22	Clay, sandy clay, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	22-28	Very gravelly clay loam, loam, very gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	28-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EnC2:												
Casco-----------	0-7	Gravelly loam	SM, SC-SM	A-2, A-1	0	0-9	55-90	50-75	30-60	15-50	0-20	2-7
	7-19	Clay loam, sandy clay loam, gravelly clay loam.	SC, CL, GC	A-6, A-7, A-2	0-1	0-9	55-100	50-100	40-90	20-80	25-46	11-26
	19-80	Stratified sand to gravel.	GP, SP, GP-GM, SP-SM	A-1, A-3, A-2	0-3	0-30	25-100	20-95	10-75	2-10	0-14	NP
EpB2:												
Eldean----------	0-7	Silty clay loam	CL	A-6, A-4	0	0-5	85-100	75-100	65-100	55-80	25-40	9-18
	7-21	Clay, clay loam, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	21-26	Very gravelly clay loam, loam, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	26-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Miamian---------	0-8	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	80-95	70-90	30-45	15-25
	8-29	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	29-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
EpC2:												
Eldean----------	0-6	Silt loam------	CL	A-6, A-4	0	0-5	85-100	75-100	65-100	55-80	25-40	9-18
	6-22	Clay, clay loam, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	22-30	Gravelly clay loam, loam, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	30-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EpC2:												
Miamian----------	0-6	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	6-27	Silty clay loam, clay loam, clay.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	27-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
EpC3:												
Eldean-----------	0-5	Clay loam------	CL	A-6, A-4	0	0-5	85-100	75-100	65-100	55-80	25-40	9-18
	5-20	Clay, sandy clay, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	20-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Miamian----------	0-7	Clay loam------	CL	A-6, A-7	0	0	90-100	85-100	75-95	60-80	30-45	15-25
	7-28	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	28-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
EpD2:												
Eldean-----------	0-6	Silt loam------	CL	A-6, A-4	0	0-5	85-100	75-100	65-100	55-80	25-40	9-18
	6-21	Clay, clay loam, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	21-26	Gravelly clay loam, loam, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	26-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Miamian----------	0-5	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	5-15	Clay loam, clay, silty clay loam.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	15-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EpD3:												
Eldean----------	0-5	Clay loam------	CL	A-6, A-4	0	0-5	85-100	75-100	65-100	55-80	25-40	9-18
	5-24	Clay, clay loam, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	24-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Miamian---------	0-6	Clay loam------	CL	A-6, A-7	0	0	90-100	85-100	75-95	60-80	30-45	15-25
	6-22	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	22-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
EpE2:												
Eldean----------	0-3	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-40	4-14
	3-24	Silty clay loam, clay loam, loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	24-35	Very gravelly clay loam, loam, gravelly loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	35-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Miamian---------	0-5	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	5-37	Clay loam, clay, silty clay loam.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	37-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EsE3:												
Eldean----------	0-3	Clay loam------	CL	A-6, A-4	0	0-5	85-100	75-100	65-100	55-80	25-40	9-18
	3-27	Clay, sandy clay, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	27-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Rodman----------	0-11	Gravelly loam	ML, CL, SM, SC	A-4	0	0-2	70-85	65-75	60-75	36-65	0-30	3-9
	11-15	Gravelly loam, very gravelly sandy loam, loam.	ML, CL, SC, SM	A-4, A-2, A-1	0	0-2	70-85	60-85	40-75	20-55	0-30	NP-10
	15-80	Stratified sand to extremely gravelly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	0-1	1-5	30-70	22-50	7-20	2-10	0-14	NP
EuB:												
Eldean----------	0-10	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-40	4-14
	10-25	Silty clay loam, clay loam, gravelly clay.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	25-31	Very gravelly clay loam, loam, gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	31-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Urban land.												

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EuC:												
Eldean----------	0-9	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-40	4-14
	9-22	Clay, clay loam, gravelly clay loam.	CL, ML	A-7, A-6	0	0-5	75-100	60-100	55-95	50-80	38-50	12-23
	22-35	Very gravelly clay, clay, very gravelly sandy loam.	CL, GC, SC	A-6, A-7, A-2	0	0-10	55-85	45-85	45-75	30-60	38-50	12-23
	35-80	Stratified sand to extremely gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0	0-15	30-70	20-50	5-40	0-35	0-14	NP
Urban land.												
Ge:												
Genesee---------	0-10	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	60-90	20-30	5-11
	10-25	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	60-90	20-30	5-11
	25-48	Silt loam, loam	ML, CL, CL-ML	A-4	0	0	100	100	85-100	60-90	0-25	3-8
	48-70	Stratified loam to gravelly loamy coarse sand.	GP, GP-GM, SP, SP-SM	A-1	0	0	30-55	25-45	10-35	1-10	0-14	NP
	70-80	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	75-95	75-90	65-90	50-80	20-36	4-16
Gn:												
Genesee---------	0-11	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	60-90	20-30	5-11
	11-42	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	60-90	20-30	5-11
	42-52	Silt loam, loam	ML, CL, CL-ML	A-4	0	0	100	100	85-100	60-90	0-25	3-8
	52-70	Stratified sandy loam to gravelly loamy coarse sand.	GP, GP-GM, SP, SP-SM	A-1	0	0	30-55	25-45	10-35	1-10	0-14	NP
	70-80	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	75-95	75-90	65-90	50-80	20-36	4-16

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Ko:												
Kokomo----------	0-19	Silty clay loam	CL, CH, ML, MH	A-6, A-7-6	0	0	90-100	85-100	75-100	55-95	35-55	10-30
	19-52	Silty clay loam, clay loam.	CL, CH	A-7, A-7-6	0	0-1	90-100	85-100	75-100	55-95	40-60	20-35
	52-80	Loam-----------	CL, CL-ML, ML, SC	A-6, A-4	0-1	0-3	90-100	85-100	70-95	45-70	15-30	NP-15
Lg:												
Linwood---------	0-14	Muck-----------	PT	A-8	0	0-20	0	0	0	0	---	NP
	14-36	Muck-----------	PT	A-8	0	0-20	0	0	0	0	---	NP
	36-80	Silt loam, sandy loam, silty clay loam.	CL, ML, SM, SC	A-4, A-6, A-2, A-1	0	0-10	90-100	75-100	45-100	20-95	15-40	NP-20
Lh:												
Linwood---------	0-9	Mucky silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	90-100	70-90	20-30	6-11
	9-28	Muck-----------	PT	A-8	0	0-20	0	0	0	0	---	NP
	28-80	Silt loam, sandy loam, silty clay loam.	CL, ML, SM, SC	A-4, A-6, A-2, A-1	0	0-10	90-100	75-100	45-100	20-95	15-40	NP-20
Lm:												
Lippincott------	0-14	Mucky silt loam	CL, CL-ML	A-6	0	0	95-100	90-100	85-100	80-95	20-35	5-15
	14-42	Silt loam, silty clay loam, clay loam.	CH, CL, ML, MH	A-7, A-6	0	0	90-100	80-100	75-100	60-95	35-60	15-35
	42-80	Gravelly loamy sand, gravelly coarse sand, extremely gravelly sand.	GP, GW, SP, SM	A-1	0	0-10	40-65	20-55	10-40	1-20	0-14	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Lp:												
Lippincott------	0-13	Silty clay loam	CL, ML	A-6, A-7	0	0	90-100	80-100	75-100	70-95	30-45	10-25
	13-27	Silty clay, clay, clay loam.	CH, CL, ML, MH	A-7, A-6	0	0	90-100	80-100	75-100	60-95	35-60	15-35
	27-34	Very gravelly sandy loam, extremely gravelly coarse sandy loam, gravelly silt loam.	GM, SM, SP-SM, GP-GM	A-1, A-2	0	0-10	40-65	20-55	10-50	5-35	0-25	NP-5
	34-80	Very gravelly loamy sand, extremely gravelly sand.	GP, GW, SP, SM	A-1	0	0-10	40-65	20-55	10-40	1-20	0-14	NP
Lu:												
Lippincott------	0-13	Silty clay loam	CL, ML	A-6, A-7	0	0	90-100	80-100	75-100	70-95	30-45	10-25
	13-23	Silty clay, clay, clay loam.	CH, CL, ML, MH	A-7, A-6	0	0	90-100	80-100	75-100	60-95	35-60	15-35
	23-29	Very gravelly sandy loam, extremely gravelly coarse sandy loam, gravelly silt loam.	GM, SM, SP-SM, GP-GM	A-1, A-2	0	0-10	40-65	20-55	10-50	5-35	0-25	NP-5
	29-80	Very gravelly loamy coarse sand, extremely gravelly sand.	GP, GW, SP, SM	A-1	0	0-10	40-65	20-55	10-40	1-20	0-14	NP
Urban land.												
MgB2:												
Miamian---------	0-8	Silty clay loam	ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	8-25	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	30-50	15-30
	25-47	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
	47-50	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MgC2:												
Miamian---------	0-7	Silty clay loam	ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	7-25	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	30-50	15-30
	25-53	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
	53-56	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
MgE2:												
Miamian---------	0-5	Silty clay loam	ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	5-26	Silty clay loam, clay loam, clay.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	30-50	15-30
	26-43	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
	43-46	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
MhA:												
Miamian---------	0-10	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	10-22	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	22-37	Clay loam, clay, silty clay loam.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	37-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MhB:												
Miamian---------	0-10	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	10-14	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	14-36	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	36-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MhB2:												
Miamian---------	0-8	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	8-30	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	30-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MhC:												
Miamian---------	0-4	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	4-9	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	9-34	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	34-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MhC2:												
Miamian---------	0-6	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	6-27	Clay loam, clay, silty clay loam.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	27-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MhD2:												
Miamian---------	0-5	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	5-8	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	8-31	Silty clay loam, clay, silt loam.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	31-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
MhE:												
Miamian---------	0-4	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	4-8	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	8-38	Silty clay loam, clay, silt loam.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	38-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MhE2:												
Miamian---------	0-5	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	5-37	Clay loam, clay, silty clay loam.	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	37-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MkB2:												
Miamian---------	0-7	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	80-95	70-90	30-45	15-25
	7-23	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	23-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MkC2:												
Miamian---------	0-7	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	80-95	70-90	30-45	15-25
	7-23	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	23-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MkD2:												
Miamian---------	0-6	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	80-95	70-90	30-45	15-25
	6-20	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	20-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MmC3:												
Miamian---------	0-7	Clay loam------	CL	A-6, A-7	0	0	90-100	85-100	75-95	60-80	30-45	15-25
	7-19	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	19-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MmD3:												
Miamian---------	0-5	Clay loam------	CL	A-6, A-7	0	0	90-100	85-100	75-95	60-80	30-45	15-25
	5-20	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	18-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MmE3:												
Miamian---------	0-4	Clay loam------	CL	A-6, A-7	0	0	90-100	85-100	75-95	60-80	30-45	15-25
	4-20	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	20-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
MnB:												
Miamian---------	0-10	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	10-14	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	14-36	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	36-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
Urban land.												
MnC:												
Miamian---------	0-4	Silt loam------	ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	70-95	25-40	4-12
	4-9	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0	85-100	80-100	75-95	70-85	30-50	10-25
	9-34	Clay loam, clay	CL	A-6, A-7	0	0-5	85-100	80-100	75-95	70-85	35-50	15-30
	34-80	Loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6	0	0-5	75-95	75-90	65-85	50-75	20-35	3-13
Urban land.												

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Mo:												
Milford---------	0-18	Silty clay loam	CL	A-7, A-6	0	0	100	100	95-100	85-95	35-45	15-25
	18-42	Silty clay loam, clay loam.	CL	A-7	0	0	100	95-100	85-100	60-95	40-50	20-30
	42-55	Stratified silty clay loam to sandy loam.	CL	A-6, A-7, A-4	0	0	95-100	90-100	60-95	60-80	25-45	7-25
	55-80	Stratified silt loam to gravelly coarse sand.	CL-ML, CL	A-4, A-6	0	0	95-100	90-100	50-95	50-80	20-30	7-15
Ms:												
Millsdale-------	0-12	Silty clay loam	CL	A-6	0	0	90-100	80-100	75-100	70-95	35-40	15-20
	12-34	Silty clay, silty clay loam, clay loam.	CH, CL	A-7	0	0-5	85-100	80-100	75-100	60-80	40-50	20-30
	34-37	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
MtA:												
Milton----------	0-10	Silt loam------	ML, CL	A-4, A-6	0	0	95-100	90-100	85-100	70-95	26-36	4-12
	10-23	Silty clay loam, clay loam, clay.	CL	A-6, A-7	0	0	95-100	80-100	75-100	70-95	32-48	12-28
	23-26	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
MtB:												
Milton----------	0-9	Silt loam------	ML, CL	A-4, A-6	0	0	95-100	90-100	85-100	70-95	26-36	4-12
	9-23	Silty clay loam, clay loam, clay.	CL	A-6, A-7	0	0	95-100	80-100	75-100	70-95	32-48	12-28
	23-31	Clay, sandy clay loam, clay loam.	CH, CL	A-7, A-6	0	0-5	95-100	80-100	70-95	50-90	32-55	14-33
	31-34	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MvC2:												
Milton----------	0-6	Silty clay loam	CL	A-6, A-7	0	0	95-100	90-100	85-100	75-95	30-45	15-25
	6-22	Silty clay loam, clay loam, clay.	CL	A-6, A-7	0	0	95-100	80-100	75-100	70-95	32-48	12-28
	22-25	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
MxB:												
Milton----------	0-9	Silt loam------	ML, CL	A-4, A-6	0	0	95-100	90-100	85-100	70-95	26-36	4-12
	9-31	Silty clay loam, clay loam, clay.	CL	A-6, A-7	0	0	95-100	80-100	75-100	70-95	32-48	12-28
	31-34	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
Urban land.												
OcA:												
Ockley----------	0-9	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	95-100	85-100	70-100	50-90	23-40	3-15
	9-34	Silt loam, clay loam, silty clay loam.	CL-ML, CL, SC-SM, SC	A-4, A-2, A-6, A-7-6	0	0-1	90-100	85-100	70-100	30-95	20-50	5-35
	34-43	Sandy clay loam, gravelly clay loam, clay loam.	ML, CL, SM, SC	A-2, A-4, A-6, A-7-6	0	0-2	70-85	45-85	25-75	15-60	10-50	NP-35
	43-80	Very gravelly loamy coarse sand, loamy coarse sand.	GW-GM, SW, SP-SM, GP	A-1	0-2	1-10	30-70	20-55	10-30	2-10	---	NP
OcB:												
Ockley----------	0-9	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	95-100	85-100	70-100	50-90	23-40	3-15
	9-36	Loam, clay loam, silty clay loam.	CL-ML, CL, SC-SM, SC	A-4, A-2, A-6, A-7-6	0	0-1	90-100	85-100	70-100	30-95	20-50	5-35
	36-49	Sandy clay loam, gravelly sandy clay loam, loam.	ML, CL, SM, SC	A-2, A-4, A-6, A-7-6	0	0-2	70-85	45-85	25-75	15-60	10-50	NP-35
	49-80	Gravelly loamy coarse sand, gravelly coarse sand.	GW-GM, SW, SP-SM, GP	A-1	0-2	1-10	60-100	50-95	30-60	5-10	---	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
Pa:												
Patton----------	0-12	Silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	30-40	15-25
	12-36	Silty clay loam, silt loam.	CL, CH, ML, MH	A-7	0	0	100	100	95-100	80-100	40-55	15-25
	36-80	Stratified silt loam to silty clay loam.	CL	A-6	0	0	100	100	95-100	75-95	25-40	10-20
Pg:												
Pits, gravel.												
Ph:												
Pits, quarry.												
RaA:												
Randolph--------	0-10	Silt loam------	CL-ML, CL	A-4, A-6	0	0	95-100	95-100	90-100	75-85	20-38	4-15
	10-25	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	0-5	75-95	75-95	75-85	70-80	35-60	14-32
	25-28	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP
RgE:												
Rodman----------	0-7	Gravelly loam	ML, CL, SM, SC	A-4	0	0-2	70-85	65-75	60-75	36-65	0-30	3-9
	7-12	Gravelly sandy loam, sandy loam, loam.	ML, CL, SC, SM	A-4, A-2, A-1	0	0-2	70-85	60-85	40-75	20-55	0-30	NP-10
	12-80	Stratified sand to extremely gravelly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	0-1	1-5	30-70	22-50	7-20	2-10	0-14	NP
Rn:												
Ross------------	0-10	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	90-100	90-100	80-100	65-95	20-35	NP-12
	10-66	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4, A-7	0	0	90-100	85-100	70-100	55-95	22-45	3-20
	66-80	Stratified gravelly sandy loam to silt loam.	CL, ML, SM, GM	A-6, A-4, A-2	0	0-5	65-100	45-100	30-100	25-80	0-30	NP-12

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Ro:												
Ross	0-10	Silty clay loam	CL	A-6, A-7	0	0	90-100	90-100	80-100	65-95	35-45	12-20
	10-34	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4, A-7	0	0	90-100	85-100	70-100	55-95	22-45	3-20
	34-80	Stratified very gravelly sandy loam to silt loam.	CL, ML, SM, GM	A-6, A-4, A-2	0	0-5	65-100	45-100	30-100	25-80	0-30	NP-12
RuA:												
Rush	0-13	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	70-90	20-30	5-15
	13-39	Silty clay loam, silt loam.	CL	A-6	0	0	100	100	90-100	70-100	30-40	10-20
	39-46	Clay loam, sandy clay loam, loam.	CL, SC	A-6, A-2-6	0	1-5	80-100	80-100	60-100	25-75	30-40	10-20
	46-58	Very gravelly sandy loam, gravelly loamy coarse sand.	SC-SM, SC, SP-SC, GC	A-2-4, A-2-6, A-4, A-6	0	1-5	65-85	25-65	25-65	10-50	20-30	5-15
	58-80	Stratified sand to extremely gravelly loamy coarse sand.	SP, SP-SM, GP, GP-GM	A-1	0-1	1-5	30-70	20-55	5-35	2-10	0-14	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
ScA:												
Savona----------	0-10	Silt loam------	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	90-100	75-90	20-35	4-12
	10-36	Clay, silty clay loam, gravelly clay.	CL, CH	A-6, A-7	0	0-5	85-100	75-100	70-100	55-95	35-60	15-30
	36-39	Gravelly silt loam, gravelly clay, gravelly sandy clay loam.	CL, SC, GC	A-4, A-6, A-2, A-7	0	0-10	65-80	50-75	40-70	25-55	30-45	8-20
	39-47	Very gravelly loam, gravelly silt loam, very gravelly sandy loam.	CL, SC, GC, SP-SM	A-1, A-2, A-4, A-6	0	0-10	50-80	30-75	20-70	10-60	20-40	3-20
	47-80	Extremely gravelly loamy coarse sand, very gravelly sand, extremely gravelly coarse sand.	GP, GP-GM, SP, SP-SM	A-1	0	5-25	30-70	20-60	10-40	2-10	0-14	NP
So:												
Sloan-----------	0-17	Silt loam------	CL, CL-ML	A-4, A-6	0	0	90-100	85-95	75-95	55-85	20-35	5-15
	17-40	Loam, silty clay loam, clay loam.	CL	A-6, A-7	0	0	85-95	80-95	65-95	50-85	30-50	10-30
	40-56	Stratified sandy loam to silty clay loam.	CL-ML, CL, SC, SC-SM	A-4, A-6, A-7	0	0	85-95	80-95	45-95	35-85	25-45	5-20
	56-80	Very gravelly loamy coarse sand, gravelly sand, gravelly loamy coarse sand.	SP, SP-SM, SM	A-1, A-3, A-2	0	0-5	55-90	50-90	20-60	3-15	0-14	NP
StB2:												
Strawn----------	0-6	Silty clay loam	CL	A-6, A-7	0	0	90-100	90-100	80-95	80-95	30-45	10-25
	6-20	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-25
	20-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-20

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
StC2:												
Strawn----------	0-6	Silty clay loam	CL	A-6, A-7	0	0	90-100	90-100	80-95	80-95	30-45	10-25
	6-20	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-25
	20-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-20
StD2:												
Strawn----------	0-4	Silty clay loam	CL	A-6, A-7	0	0	90-100	90-100	80-95	80-95	30-45	10-25
	4-16	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-25
	16-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-20
StE2:												
Strawn----------	0-4	Silty clay loam	CL	A-6, A-7	0	0	90-100	90-100	80-95	80-95	30-45	10-25
	4-15	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-25
	15-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-20
SuA:												
Strawn----------	0-9	Silt loam------	CL, ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	90-100	20-40	3-20
	9-18	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-23
	18-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-18
Crosby----------	0-9	Silt loam------	CL, ML, CL-ML	A-4, A-6	0	0	95-100	90-100	80-95	60-85	15-40	NP-15
	9-25	Clay, silty clay loam, silty clay.	CL, CH	A-6, A-7-6	0-1	0-3	90-100	85-100	75-95	55-90	30-60	10-35
	25-80	Loam, fine sandy loam.	CL, SM, ML, SC	A-4, A-6	0-1	0-3	85-100	80-98	65-90	40-70	15-30	NP-15

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
SuB:												
Strawn----------	0-10	Silt loam------	CL, ML, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	90-100	20-40	3-20
	10-17	Silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	90-100	80-100	75-95	50-95	25-45	10-23
	17-80	Loam, silt loam, clay loam.	CL, SC	A-4, A-6	0-1	0-5	75-100	70-100	60-95	40-95	20-35	7-18
Crosby----------	0-10	Silt loam------	CL, ML, CL-ML	A-4, A-6	0	0	95-100	90-100	80-95	60-85	15-40	NP-15
	10-30	Clay, silty clay loam, silty clay.	CL, CH	A-6, A-7-6	0-1	0-3	90-100	85-100	75-95	55-90	30-60	10-35
	30-80	Loam, fine sandy loam.	CL, SM, ML, SC	A-4, A-6	0-1	0-3	85-100	80-98	65-90	40-70	15-30	NP-15
ThA:												
Thackery--------	0-11	Silt loam------	ML, CL-ML, CL	A-4, A-6	0	0	100	90-100	85-100	70-90	22-36	3-14
	11-16	Silt loam, loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	0	100	90-100	80-95	65-90	25-40	6-14
	16-36	Clay loam, sandy clay loam, gravelly clay loam.	CL	A-6, A-4	0	0-2	80-100	75-95	70-85	60-75	25-40	8-18
	36-53	Very gravelly sandy loam, gravelly sandy clay loam, extremely gravelly sandy loam.	GM, SM, SC, GC	A-2, A-4, A-6	0	0-5	50-80	40-70	30-60	25-50	0-35	NP-12
	53-80	Stratified extremely gravelly loamy sand to gravelly sand.	GM, GW, GP, GP-GM	A-1	0	0-5	25-55	15-45	10-35	2-25	0-14	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Tr:												
Tremont---------	0-7	Silty clay loam	ML, CL	A-7, A-6	0	0	95-100	90-100	90-100	80-100	35-50	10-20
	7-29	Clay loam, silty clay loam, loam.	ML, CL	A-6, A-4, A-7	0	0	95-100	90-100	80-100	65-95	30-45	5-20
	29-54	Clay loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6	0	0	95-100	85-100	75-95	60-90	20-35	5-15
	54-80	Gravelly, loam, very gravelly coarse sandy loam.	GW-GM, GM, SM	A-1, A-2-4	0	0-10	50-90	30-75	20-65	10-50	0-20	NP-5
Ts:												
Tremont---------	0-18	Silt loam------	ML, CL	A-7, A-6, A-4	0	0	95-100	90-100	85-100	70-90	30-45	5-15
	18-28	Clay loam, silty clay loam, loam.	ML, CL	A-6, A-4, A-7	0	0	95-100	90-100	80-100	65-95	30-45	5-20
	28-40	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6	0	0	95-100	85-100	75-95	60-90	20-35	5-15
	40-80	Loam, very gravelly coarse sandy loam, coarse sandy loam.	GW-GM, GM, SM	A-1, A-2-4	0	0-10	50-90	30-75	20-65	10-50	0-20	NP-5
Ud:												
Udorthents.												
Ur:												
Urban land.												

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Wc:												
Wallkill--------	0-6	Silt loam------	ML, SM, OL	A-5, A-7	0	0	95-100	90-100	70-100	40-90	40-50	5-15
	6-19	Silt loam, gravelly loam, silty clay loam.	CL, CL-ML, SC-SM, SC	A-4	0	0	75-100	70-100	60-100	40-90	15-25	5-10
	19-53	Sapric material, coprogenous earth, hemic material.	PT, OL	A-8	0	0	0	0	0	0	0-14	NP
	53-80	Gravelly loam, very gravelly sandy loam.	PT	A-8	0	0	0	0	0	0	0-14	NP
WeA:												
Warsaw----------	0-12	Silt loam------	CL, CL-ML	A-4, A-6	0	0	85-100	85-100	70-100	50-90	20-30	4-12
	12-22	Silty clay loam, loam, clay loam.	SC, CL, CL-ML, SC-SM	A-6, A-2-6, A-4, A-2-4	0	0-3	90-100	85-100	60-90	30-70	20-35	6-15
	22-36	Gravelly sandy clay loam, gravelly clay loam, gravelly sandy loam.	CL, SC, GC, SC-SM	A-6, A-2-6, A-4, A-2-4	0	0-5	70-90	60-85	55-70	30-60	20-35	6-15
	36-80	Stratified sand to very gravelly coarse sand.	SP, GP, SP-SM, GP-GM	A-1	0	1-5	30-70	22-55	7-20	2-10	0-20	NP
WpA:												
Waupecan--------	0-17	Silt loam------	CL	A-4, A-6	0	0	100	100	90-100	85-95	20-35	8-15
	17-35	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-45	15-25
	35-48	Stratified clay loam to gravelly loamy sand.	SM, SC, ML, CL	A-2, A-4	0	0	90-100	65-90	50-70	25-65	0-20	NP-10
	48-80	Sand and gravel, very gravelly coarse sand, gravelly loamy coarse sand.	GP, SP, SP-SM, GP-GM	A-1	0-5	10-35	40-95	30-85	30-50	0-15	0-14	NP

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
WrA:												
Waynetown-------	0-11	Silt loam------	CL-ML, CL, ML	A-4	0	0	100	95-100	85-100	70-90	0-25	3-8
	11-34	Silty clay loam	CL	A-6	0	0	100	95-100	90-100	80-95	30-40	10-16
	34-45	Loam, clay loam	CL	A-6, A-4	0	0	90-100	90-100	75-100	50-80	25-35	8-14
	45-66	Gravelly loam, gravelly sandy loam, gravelly clay loam.	CL, SC, GC	A-4, A-6, A-2-4, A-2-6	0	0-3	60-85	55-80	45-75	20-55	25-35	8-15
	66-80	Very gravelly coarse sand, gravelly loamy coarse sand.	SP, SP-SM, GP, GP-GM	A-1	0-1	1-5	45-80	45-70	20-50	3-11	0-14	NP
Wt:												
Westland--------	0-11	Silty clay loam	CL, CH, ML, MH	A-6, A-7-6	0	0	90-100	90-100	85-100	75-95	35-55	10-30
	11-35	Clay loam, silty clay loam, very gravelly sandy loam.	CL, SC, CL-ML, SC-SM	A-4, A-6, A-7-6	0	0-5	55-100	45-95	25-85	15-70	20-55	5-35
	35-51	Clay loam, sandy loam, gravelly loam.	SM, SC, ML, CL	A-4, A-6, A-2-4	0	0-5	55-100	45-95	25-85	15-70	10-35	NP-15
	51-80	Very gravelly coarse sand, loamy coarse sand.	SP, SP-SM, GP, GP-GM	A-1, A-1-b	0	0-12	40-75	35-70	10-45	0-10	---	NP

Table 16.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Cation-exchange capacity	Calcium carbonate	Shrink-swell potential	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
Ad:															
Adrian----------	0-22	---	0.30-0.55	0.20-6.00	0.35-0.45	5.1-7.8	125-200	---	---------	---	---	2	2	134	55-75
	22-80	2-10	1.40-1.75	6.00-20.00	0.03-0.08	5.6-8.4	1.0-2.0	0-40	Low------	0.15	0.15				0.0-1.0
Ae:															
Adrian----------	0-36	---	0.30-0.55	0.20-6.00	0.35-0.45	5.1-7.8	125-200	---	---------	---	---	2	2	134	55-75
	36-80	2-10	1.40-1.75	6.00-20.00	0.03-0.08	5.6-8.4	1.0-2.0	0-40	Low------	0.15	0.15				0.0-1.0
Ca, Cb:															
Carlisle--------	0-80	---	0.13-0.23	0.20-6.00	0.35-0.45	4.5-7.3	150-230	---	---------	---	---	5	2	134	70-99
CcD2:															
Casco-----------	0-7	5-15	1.35-1.60	0.60-2.00	0.08-0.12	5.6-7.3	3.0-15.0	---	Low------	0.17	0.24	3	3	86	1.0-2.0
	7-17	18-35	1.55-1.65	0.60-2.00	0.09-0.19	5.6-7.8	4.0-30.0	0-3	Moderate	0.32	0.32				0.0-0.5
	17-80	0-2	1.30-1.70	6.00-20.00	0.02-0.04	7.4-8.4	0.0-3.0	1-25	Low------	0.10	0.10				0.0-0.5
CeA:															
Celina----------	0-9	14-26	1.30-1.50	0.60-2.00	0.20-0.24	5.1-7.3	9.0-19.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	9-30	35-48	1.45-1.60	0.20-0.60	0.16-0.19	4.5-7.8	18.0-32.0	0-15	Moderate	0.37	0.37				0.5-1.0
	30-80	16-27	1.60-1.82	0.20-0.60	0.06-0.10	7.4-8.4	8.0-14.0	25-45	Low------	0.37	0.49				0.3-0.5
CeB:															
Celina----------	0-8	14-26	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	9.0-19.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	8-27	35-48	1.45-1.60	0.20-0.60	0.16-0.19	4.5-7.8	18.0-32.0	0-15	Moderate	0.37	0.37				0.5-1.0
	27-80	16-27	1.60-1.82	0.20-0.60	0.06-0.10	7.4-8.4	8.0-14.0	25-45	Low------	0.37	0.49				0.3-0.5
ChA:															
Celina----------	0-10	14-26	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	9.0-19.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	10-30	35-48	1.45-1.60	0.20-0.60	0.16-0.19	4.5-7.8	18.0-32.0	0-15	Moderate	0.37	0.37				0.5-1.0
	30-80	16-27	1.60-1.82	0.20-0.60	0.06-0.10	7.4-8.4	8.0-14.0	25-45	Low------	0.37	0.49				0.3-0.5
Strawn----------	0-10	18-27	1.15-1.45	0.60-2.00	0.20-0.24	6.1-7.3	13.0-22.0	---	Low------	0.37	0.37	5	6	48	1.0-3.0
	10-23	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	23-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5
ChB:															
Celina----------	0-10	14-26	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	9.0-19.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	10-30	35-48	1.45-1.60	0.20-0.60	0.16-0.19	4.5-7.8	18.0-32.0	0-15	Moderate	0.37	0.37				0.5-1.0
	30-80	16-27	1.60-1.82	0.20-0.60	0.06-0.10	7.4-8.4	8.0-14.0	25-45	Low------	0.37	0.49				0.3-0.5
Strawn----------	0-10	27-30	1.35-1.55	0.60-2.00	0.18-0.20	5.6-7.3	18.0-22.0	---	Moderate	0.37	0.37	5	7	38	1.0-2.0
	10-23	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	23-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
CrA:															
Crosby----------	0-9	10-24	1.30-1.60	0.60-2.00	0.18-0.24	5.1-7.3	6.0-20.0	---	Low------	0.43	0.43	4	5	56	1.0-3.0
	9-25	35-45	1.45-1.65	0.60-2.00	0.11-0.16	5.1-7.3	15.0-29.0	---	Moderate	0.28	0.32				0.5-1.0
	25-80	10-25	1.75-1.95	0.01-0.20	0.02-0.04	7.4-8.4	4.0-16.0	20-50	Low------	0.32	0.43				0.0-0.5
CrB:															
Crosby----------	0-9	10-24	1.30-1.60	0.60-2.00	0.18-0.24	5.1-7.3	6.0-20.0	---	Low------	0.43	0.43	4	5	56	1.0-3.0
	9-35	35-45	1.45-1.65	0.60-2.00	0.11-0.16	5.1-7.3	15.0-29.0	---	Moderate	0.28	0.32				0.5-1.0
	35-80	10-25	1.75-1.95	0.01-0.20	0.02-0.04	7.4-8.4	4.0-16.0	20-50	Low------	0.32	0.43				0.0-0.5
DoE:															
Donnelsville----	0-21	15-24	1.20-1.35	0.60-6.00	0.10-0.01	7.4-8.4	15.0-24.0	30-55	Low------	0.17	0.64	3	8	---	5.0-10
	21-36	12-22	1.30-1.50	0.60-2.00	0.03-0.11	7.4-8.4	8.0-15.0	40-65	Low------	0.10	0.43				1.0-3.0
	36-47	8-16	1.30-1.50	2.00-6.00	0.02-0.08	7.4-8.4	5.0-10.0	50-65	Low------	0.06	0.55				0.0-0.5
	47-50	---	---	---	---	---	---	---		---	---				---
DpF:															
Donnelsville----	0-14	15-24	1.20-1.35	0.60-6.00	0.08-0.12	7.4-8.4	15.0-24.0	30-55	Low------	0.12	0.37	5	8	---	5.0-10
	14-30	12-22	1.30-1.50	0.60-2.00	0.03-0.11	7.4-8.4	8.0-15.0	40-65	Low------	0.10	0.43				1.0-3.0
	30-55	8-16	1.30-1.50	2.00-6.00	0.02-0.08	7.4-8.4	5.0-10.0	50-65	Low------	0.06	0.55				0.0-0.5
	55-58	---	---	---	---	---	---	---	---------	---	---				---
Rock outcrop.															
Dr:															
Drummer---------	0-15	27-35	1.10-1.30	0.60-2.00	0.21-0.23	5.6-7.3	25.0-35.0	---	Moderate	0.28	0.28	4	7	38	5.0-7.0
	15-42	27-35	1.20-1.45	0.60-2.00	0.18-0.20	5.6-7.3	16.0-23.0	---	Moderate	0.28	0.28				0.0-1.0
	42-47	22-33	1.30-1.55	0.60-2.00	0.15-0.19	5.6-7.3	13.0-21.0	---	Moderate	0.28	0.28				0.0-0.5
	47-80	1-8	1.80-2.10	>20.00	0.02-0.04	6.6-8.4	1.0-8.0	---	Low------	0.10	---				0.0-0.2
EmA:															
Eldean----------	0-10	15-25	1.30-1.50	0.60-2.00	0.18-0.22	5.6-7.3	8.0-21.0	---	Low------	0.37	0.43	4	5	56	1.0-3.0
	10-31	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	31-38	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	38-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
EmB:															
Eldean----------	0-10	15-25	1.30-1.50	0.60-2.00	0.18-0.22	5.6-7.3	8.0-21.0	---	Low------	0.37	0.43	4	5	56	1.0-3.0
	10-31	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	31-38	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	38-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
EmB2:															
Eldean----------	0-8	15-25	1.30-1.50	0.60-2.00	0.18-0.22	5.6-7.3	8.0-21.0	---	Low------	0.37	0.43	4	5	56	1.0-3.0
	8-18	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	18-24	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	24-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
EmC2:															
Eldean----------	0-9	15-25	1.30-1.50	0.60-2.00	0.18-0.22	5.6-7.3	8.0-21.0	---	Low------	0.37	0.43	4	5	56	1.0-3.0
	9-22	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	22-28	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	28-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
EnC2:															
Eldean----------	0-7	27-33	1.35-1.55	0.60-2.00	0.16-0.18	5.6-7.3	12.0-24.0	---	Moderate	0.32	0.37	4	6	48	0.5-2.0
	7-22	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	22-28	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	28-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Casco-----------	0-7	5-15	1.35-1.60	0.60-2.00	0.08-0.12	5.6-7.3	3.0-15.0	---	Low------	0.17	0.24	3	3	86	1.0-2.0
	7-19	18-35	1.55-1.65	0.60-2.00	0.09-0.19	5.6-7.8	4.0-30.0	0-3	Moderate	0.32	0.32				0.0-0.5
	19-80	0-2	1.30-1.70	6.00-20.00	0.02-0.04	7.4-8.4	0.0-3.0	1-25	Low------	0.10	0.10				0.0-0.5
EpB2:															
Eldean----------	0-7	27-33	1.35-1.55	0.60-2.00	0.16-0.18	5.6-7.3	12.0-24.0	---	Moderate	0.32	0.37	4	6	48	0.5-2.0
	7-21	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	21-26	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	26-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Miamian---------	0-8	27-32	1.35-1.55	0.20-0.60	0.17-0.23	5.6-7.3	14.0-20.0	---	Moderate	0.37	0.37	4	7	38	0.5-2.0
	8-29	35-48	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	29-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
EpC2:															
Eldean----------	0-6	15-25	1.35-1.55	0.60-2.00	0.16-0.18	5.6-7.3	12.0-24.0	---	Moderate	0.32	0.37	4	6	48	0.5-2.0
	6-22	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	22-30	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	30-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Miamian---------	0-6	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	6-27	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	27-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
EpC3:															
Eldean----------	0-5	27-33	1.35-1.55	0.60-2.00	0.16-0.18	5.6-7.3	12.0-24.0	---	Moderate	0.32	0.37	3	6	48	0.5-2.0
	5-20	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	20-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Miamian---------	0-7	27-32	1.35-1.55	0.20-0.60	0.16-0.19	4.5-7.3	14.0-20.0	---	Moderate	0.32	0.32	3	6	48	0.5-2.0
	7-28	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	28-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
EpD2:															
Eldean----------	0-6	15-25	1.35-1.55	0.60-2.00	0.16-0.18	5.6-7.3	12.0-24.0	---	Moderate	0.32	0.37	4	6	48	0.5-2.0
	6-21	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	21-26	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	26-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Miamian---------	0-5	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	5-15	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	15-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
EpD3:															
Eldean----------	0-5	27-33	1.35-1.55	0.60-2.00	0.16-0.18	5.6-7.3	12.0-24.0	---	Moderate	0.32	0.37	3	6	48	0.5-2.0
	5-24	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	24-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Miamian---------	0-6	27-32	1.35-1.55	0.20-0.60	0.16-0.19	4.5-7.3	14.0-20.0	---	Moderate	0.32	0.32	3	6	48	0.5-2.0
	6-22	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	22-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
EpE2:															
Eldean----------	0-3	15-25	1.30-1.50	0.60-2.00	0.18-0.22	5.6-7.3	8.0-21.0	---	Low------	0.37	0.43	4	5	56	1.0-3.0
	3-24	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	24-35	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	35-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Miamian---------	0-5	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	5-37	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	37-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
EsE3:															
Eldean----------	0-3	27-33	1.35-1.55	0.60-2.00	0.16-0.18	5.6-7.3	12.0-24.0	---	Moderate	0.32	0.37	4	6	48	0.5-2.0
	3-27	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	27-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Rodman----------	0-11	8-25	1.20-1.50	2.00-6.00	0.10-0.12	6.6-7.8	5.0-18.0	0-15	Low------	0.20	0.32	2	8	---	2.0-4.0
	11-15	5-25	1.10-1.50	2.00-6.00	0.09-0.12	6.6-7.8	1.0-14.0	0-25	Low------	0.20	0.32				0.0-2.0
	15-80	0-10	1.60-1.70	>20.00	0.02-0.04	7.4-8.4	1.0-6.0	10-45	Low------	0.10	0.37				0.0-1.0
EuB:															
Eldean----------	0-10	15-25	1.30-1.50	0.60-2.00	0.18-0.22	5.6-7.3	8.0-21.0	---	Low------	0.37	0.43	4	5	56	1.0-3.0
	10-25	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	25-31	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	31-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Urban land.															

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
EuC:															
Eldean----------	0-9	15-25	1.30-1.50	0.60-2.00	0.18-0.22	5.6-7.3	8.0-21.0	---	Low------	0.37	0.43	4	5	56	1.0-3.0
	9-22	35-48	1.40-1.60	0.20-2.00	0.08-0.14	5.6-7.8	20.0-30.0	---	Moderate	0.37	0.49				0.5-1.0
	22-35	25-45	1.30-1.60	0.60-2.00	0.07-0.14	6.6-8.4	20.0-30.0	10-50	Low------	0.37	0.64				0.5-1.0
	35-80	2-8	1.55-1.70	6.00-20.00	0.01-0.04	7.4-8.4	1.0-8.0	40-65	Low------	0.10	0.43				0.5-1.0
Urban land.															
Ge:															
Genesee---------	0-10	17-25	1.30-1.50	0.60-2.00	0.20-0.24	6.6-7.8	9.0-21.0	0-10	Low------	0.32	0.32	5	6	48	1.0-3.0
	10-25	17-25	1.30-1.50	0.60-2.00	0.20-0.24	6.6-7.8	8.0-21.0	0-10	Low------	0.32	0.32				1.0-3.0
	25-48	10-20	1.30-1.60	0.60-2.00	0.17-0.22	6.6-8.4	8.0-19.0	0-25	Low------	0.32	0.32				0.5-1.0
	48-70	0-5	1.50-1.70	0.60-2.00	0.01-0.04	7.4-8.4	5.0-14.0	0-30	Low------	0.10	0.32				0.5-1.0
	70-80	15-25	1.60-1.82	0.20-0.60	0.06-0.10	7.4-8.4	0.0-5.0	10-40	Low------	0.10	0.37				0.0-0.5
Gn:															
Genesee---------	0-11	17-25	1.30-1.50	0.60-2.00	0.20-0.24	6.6-7.8	9.0-21.0	0-10	Low------	0.32	0.32	5	6	48	1.0-3.0
	11-42	17-25	1.30-1.50	0.60-2.00	0.20-0.24	6.6-7.8	8.0-21.0	0-10	Low------	0.32	0.32				1.0-3.0
	42-52	10-20	1.30-1.60	0.60-2.00	0.17-0.22	6.6-8.4	8.0-19.0	0-25	Low------	0.32	0.32				0.5-1.0
	52-70	0-5	1.50-1.70	0.60-2.00	0.01-0.04	7.4-8.4	5.0-14.0	0-30	Low------	0.10	0.32				0.5-1.0
	70-80	15-25	1.60-1.82	0.20-0.60	0.06-0.10	7.4-8.4	0.0-5.0	10-40	Low------	0.10	0.37				0.0-0.5
Ko:															
Kokomo----------	0-19	27-35	1.30-1.60	0.60-2.00	0.17-0.19	5.6-7.3	16.0-33.0	---	Moderate	0.24	0.24	5	7	38	3.0-6.0
	19-52	35-40	1.40-1.70	0.20-0.60	0.12-0.21	5.6-7.8	16.0-28.0	---	Moderate	0.28	0.32				1.0-2.0
	52-80	16-25	1.50-1.75	0.06-0.20	0.08-0.15	7.4-8.4	6.0-17.0	15-35	Low------	0.32	0.37				0.0-1.0
Lg:															
Linwood---------	0-14	---	0.15-0.40	0.20-6.00	0.35-0.45	4.5-7.8	150-230	---	---------	---	---	2	2	134	40-70
	14-36	---	0.15-0.40	0.20-6.00	0.35-0.45	4.5-7.8	150-230	---	---------	---	---				50-70
	36-80	5-35	1.60-1.90	0.20-2.00	0.11-0.20	5.6-8.4	2.0-20.0	5-25	Low------	0.24	0.28				0.0-0.5
Lh:															
Linwood---------	0-9	12-20	0.90-1.20	0.60-2.00	0.22-0.24	4.5-7.8	10.0-30.0	---	Low------	0.24	0.24	2	5	56	10-20
	9-28	---	0.15-0.40	0.20-6.00	0.35-0.45	4.5-7.8	150-230	---	---------	---	---				50-70
	28-80	5-35	1.60-1.90	0.20-2.00	0.11-0.20	5.6-8.4	2.0-20.0	5-25	Low------	0.24	0.28				0.0-0.5
Lm:															
Lippincott------	0-14	20-27	0.90-1.20	0.60-2.00	0.22-0.30	6.1-7.3	28.0-56.0	---	Low------	0.28	0.28	4	6	48	10-20
	14-42	35-50	1.45-1.60	0.60-2.00	0.13-0.17	6.6-7.8	14.0-30.0	---	Moderate	0.28	0.32				0.5-2.0
	42-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	7.4-8.4	1.0-6.0	40-65	Low------	0.10	0.37				0.1-0.5
Lp:															
Lippincott------	0-13	27-36	1.35-1.50	0.60-2.00	0.17-0.23	6.1-7.3	20.0-40.0	---	Moderate	0.28	0.32	4	7	38	4.0-8.0
	13-27	35-50	1.45-1.60	0.60-2.00	0.13-0.17	6.6-7.8	14.0-30.0	---	Moderate	0.28	0.32				0.5-2.0
	27-34	5-15	1.50-1.75	6.00-20.00	0.04-0.10	7.4-8.4	2.0-10.0	30-55	Low------	0.10	0.37				0.2-0.5
	34-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	7.4-8.4	1.0-6.0	40-65	Low------	0.10	0.37				0.1-0.3

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Cation-exchange capacity	Calcium carbonate	Shrink-swell potential	Erosion factors K	Kf	T	Wind erodi-bility group	Wind erodi-bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
Lu:															
Lippincott------	0-13	27-36	1.35-1.50	0.60-2.00	0.17-0.23	6.1-7.3	20.0-40.0	---	Moderate	0.28	0.32	4	7	38	4.0-8.0
	13-23	35-50	1.45-1.60	0.60-2.00	0.13-0.17	6.6-7.8	14.0-30.0	---	Moderate	0.28	0.32				0.5-2.0
	23-29	5-15	1.50-1.75	6.00-20.00	0.04-0.10	7.4-8.4	2.0-10.0	30-55	Low------	0.10	0.37				0.2-0.5
	29-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	7.4-8.4	1.0-6.0	40-65	Low------	0.10	0.37				0.1-0.3
Urban land.															
MgB2:															
Miamian---------	0-8	28-35	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-20.0	---	Low------	0.37	0.37	5	6	48	1.0-3.0
	8-25	35-48	1.50-1.70	0.20-0.60	0.12-0.18	5.1-7.3	17.0-25.0	---	Moderate	0.37	0.43				0.2-0.5
	25-47	16-31	1.60-1.80	0.20-0.60	0.06-0.10	7.4-8.4	8.0-16.0	25-45	Low------	0.37	0.49				0.1-0.3
	47-50	---	---	0.00-0.60	---	---	---	---		---	---				---
MgC2:															
Miamian---------	0-7	28-35	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-20.0	---	Low------	0.37	0.37	5	6	48	1.0-3.0
	7-25	35-48	1.50-1.70	0.20-0.60	0.12-0.18	5.1-7.3	17.0-25.0	---	Moderate	0.37	0.43				0.2-0.5
	25-53	16-31	1.60-1.80	0.20-0.60	0.06-0.10	7.4-8.4	8.0-16.0	25-45	Low------	0.37	0.49				0.1-0.3
	53-56	---	---	0.00-0.60	---	---	---	---		---	---				---
MgE2:															
Miamian---------	0-5	28-35	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-20.0	---	Low------	0.37	0.37	5	6	48	1.0-3.0
	5-26	35-48	1.50-1.70	0.20-0.60	0.12-0.18	5.1-7.3	17.0-25.0	---	Moderate	0.37	0.43				0.2-0.5
	26-43	16-31	1.60-1.80	0.20-0.60	0.06-0.10	7.4-8.4	8.0-16.0	25-45	Low------	0.37	0.49				0.1-0.3
	43-46	---	---	0.00-0.60	---	---	---	---		---	---				---
MhA:															
Miamian---------	0-10	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	10-22	25-35	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	22-37	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	37-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MhB:															
Miamian---------	0-10	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	10-14	25-35	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	14-36	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	36-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MhB2:															
Miamian---------	0-8	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	8-30	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	30-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
MhC:															
Miamian---------	0-4	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	4-9	25-35	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	9-34	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	34-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MhC2:															
Miamian---------	0-6	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	6-27	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	27-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MhD2:															
Miamian---------	0-5	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	5-8	25-35	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	8-31	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	31-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MhE:															
Miamian---------	0-4	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	4-8	25-35	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	8-38	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	38-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MhE2:															
Miamian---------	0-5	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	5-37	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	37-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MkB2:															
Miamian---------	0-7	27-32	1.35-1.55	0.20-0.60	0.17-0.23	5.6-7.3	14.0-20.0	---	Moderate	0.37	0.37	4	7	38	0.5-2.0
	7-23	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	23-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MkC2:															
Miamian---------	0-7	27-32	1.35-1.55	0.20-0.60	0.17-0.23	5.6-7.3	14.0-20.0	---	Moderate	0.37	0.37	4	7	38	0.5-2.0
	7-23	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	23-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
MkD2:															
Miamian---------	0-6	27-32	1.35-1.55	0.20-0.60	0.17-0.23	5.6-7.3	14.0-20.0	---	Moderate	0.37	0.37	4	7	38	0.5-2.0
	6-20	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	20-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
MmC3:															
Miamian---------	0-7	27-32	1.35-1.55	0.20-0.60	0.16-0.19	4.5-7.3	14.0-20.0	---	Moderate	0.32	0.32	3	6	48	0.3-1.0
	7-19	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.1-0.5
	19-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.0-0.5
MmD3:															
Miamian---------	0-5	27-32	1.35-1.55	0.20-0.60	0.16-0.19	4.5-7.3	14.0-20.0	---	Moderate	0.32	0.32	3	6	48	0.3-1.0
	5-20	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.1-0.5
	18-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.0-0.5
MmE3:															
Miamian---------	0-4	27-32	1.35-1.55	0.20-0.60	0.16-0.19	4.5-7.3	14.0-20.0	---	Moderate	0.32	0.32	3	6	48	0.3-1.0
	4-20	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.1-0.5
	20-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.0-0.5
MnB:															
Miamian---------	0-10	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	10-14	25-35	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	14-36	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	36-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
Urban land.															
MnC:															
Miamian---------	0-4	14-27	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-18.0	---	Low------	0.37	0.37	4	6	48	1.0-3.0
	4-9	25-35	1.40-1.60	0.20-0.60	0.16-0.20	5.1-7.3	12.0-22.0	---	Moderate	0.37	0.43				0.5-1.0
	9-34	35-48	1.45-1.70	0.20-0.60	0.12-0.17	5.1-7.8	17.0-28.0	0-15	Moderate	0.37	0.43				0.3-1.0
	34-80	16-31	1.60-1.85	0.20-0.60	0.06-0.10	7.4-8.4	7.0-16.0	25-45	Low------	0.37	0.49				0.1-0.5
Urban land.															
Mo:															
Milford---------	0-18	30-40	1.35-1.45	0.60-2.00	0.21-0.23	6.1-7.8	26.0-36.0	---	Moderate	0.28	0.28	5	4	86	4.0-6.0
	18-42	35-40	1.40-1.60	0.20-0.60	0.15-0.20	5.6-7.3	22.0-29.0	---	Moderate	0.28	0.28				0.5-2.0
	42-55	18-35	1.50-1.60	0.20-0.60	0.15-0.21	6.6-7.8	4.0-18.0	0-10	Moderate	0.28	0.28				0.0-1.0
	55-80	0-15	1.50-1.60	2.00-6.00	0.18-0.22	7.4-8.4	1.0-15.0	5-30	Low------	0.28	0.28				0.0-1.0
Ms:															
Millsdale-------	0-12	27-35	1.30-1.50	0.60-2.00	0.17-0.22	6.1-7.3	20.0-36.0	---	Moderate	0.28	0.32	2	7	38	4.0-7.0
	12-34	35-45	1.40-1.65	0.20-0.60	0.12-0.16	6.1-8.4	15.0-30.0	0-10	High-----	0.32	0.37				0.5-2.0
	34-37	---	---	0.00-0.60	---	---	---	---	---------	---	---				---
MtA:															
Milton----------	0-10	14-27	1.30-1.50	0.60-2.00	0.18-0.23	4.5-7.3	10.0-22.0	---	Low------	0.37	0.37	2	6	48	1.0-3.0
	10-23	35-50	1.45-1.65	0.20-2.00	0.12-0.18	4.5-7.8	16.0-30.0	---	Moderate	0.37	0.43				0.3-1.0
	23-26	---	---	0.06-0.60	---	---	---	---	---------	---	---				---

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Cation-exchange capacity	Calcium carbonate	Shrink-swell potential	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
MtB:															
Milton----------	0-9	14-27	1.30-1.50	0.60-2.00	0.18-0.23	4.5-7.3	10.0-22.0	---	Low------	0.37	0.37	2	6	48	1.0-3.0
	9-23	35-50	1.45-1.65	0.20-2.00	0.12-0.18	4.5-7.8	16.0-30.0	---	Moderate	0.37	0.43				0.3-1.0
	23-31	25-45	1.40-1.70	0.20-2.00	0.12-0.16	6.1-8.4	10.0-27.0	5-15	Moderate	0.37	0.43				0.1-0.3
	31-34	---	---	0.06-0.60	---	---	---	---	---------	---	---				---
MvC2:															
Milton----------	0-6	27-32	1.35-1.55	0.60-2.00	0.19-0.23	4.5-7.3	16.0-24.0	---	Moderate	0.37	0.37	2	7	38	0.5-2.0
	6-22	35-50	1.45-1.65	0.20-2.00	0.12-0.18	4.5-7.8	16.0-30.0	---	Moderate	0.37	0.43				0.3-1.0
	22-25	---	---	0.06-0.60	---	---	---	---	---------	---	---				---
MxB:															
Milton----------	0-9	14-27	1.30-1.50	0.60-2.00	0.18-0.23	4.5-7.3	10.0-22.0	---	Low------	0.37	0.37	2	6	48	1.0-3.0
	9-31	35-50	1.45-1.65	0.20-2.00	0.12-0.18	4.5-7.8	16.0-30.0	---	Moderate	0.37	0.43				0.3-1.0
	31-34	---	---	0.06-0.60	---	---	---	---	---------	---	---				---
Urban land.															
OcA:															
Ockley----------	0-9	11-22	1.30-1.60	0.60-2.00	0.16-0.24	5.6-7.3	3.0-15.0	---	Low------	0.32	0.37	4	5	56	1.0-3.0
	9-34	22-34	1.40-1.60	0.60-2.00	0.13-0.20	4.5-6.5	5.0-15.0	---	Moderate	0.32	0.37				0.5-1.0
	34-43	10-32	1.40-1.70	0.60-6.00	0.05-0.20	5.1-7.3	2.0-15.0	---	Moderate	0.10	0.20				0.5-1.0
	43-80	2-5	1.60-1.80	>20.00	0.02-0.04	7.4-8.4	1.0-3.0	20-50	Low------	0.02	0.10				0.0-0.5
OcB:															
Ockley----------	0-9	11-22	1.30-1.60	0.60-2.00	0.16-0.24	5.6-7.3	3.0-15.0	---	Low------	0.32	0.37	4	5	56	1.0-3.0
	9-36	22-34	1.40-1.60	0.60-2.00	0.13-0.20	4.5-6.5	5.0-15.0	---	Moderate	0.32	0.37				0.5-1.0
	36-49	10-32	1.40-1.70	0.60-6.00	0.05-0.20	5.1-7.3	2.0-15.0	---	Moderate	0.10	0.20				0.5-1.0
	49-80	2-5	1.60-1.80	>20.00	0.02-0.04	7.4-8.4	1.0-3.0	20-50	Low------	0.02	0.10				0.0-0.5
Pa:															
Patton----------	0-12	27-35	1.15-1.35	0.60-2.00	0.21-0.23	6.6-7.3	22.0-31.0	---	Moderate	0.28	0.28	5	7	38	3.0-5.0
	12-36	27-35	1.25-1.45	0.60-2.00	0.18-0.20	6.1-8.4	18.0-27.0	---	Moderate	0.43	0.43				1.0-3.0
	36-80	22-35	1.30-1.50	0.20-0.60	0.18-0.22	7.4-8.4	14.0-23.0	---	Moderate	0.43	0.43				0.5-1.0
Pg:															
Pits, gravel.															
Ph:															
Pits, quarry.															
RaA:															
Randolph--------	0-10	16-27	1.30-1.45	0.60-2.00	0.17-0.22	5.1-7.3	8.0-22.0	---	Low------	0.37	0.37	2	6	48	1.0-3.0
	10-25	35-50	1.40-1.65	0.20-0.60	0.13-0.16	5.1-7.8	14.0-30.0	0-15	Moderate	0.37	0.43				0.3-1.0
	25-28	---	---	0.06-0.60	---	---	---	---	---------	---	---				---

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
RgE:															
Rodman----------	0-7	8-25	1.20-1.50	2.00-6.00	0.10-0.12	6.6-8.4	5.0-18.0	0-15	Low------	0.20	0.32	3	8	---	2.0-4.0
	7-12	5-25	1.10-1.50	2.00-6.00	0.09-0.12	6.6-8.4	1.0-14.0	0-25	Low------	0.20	0.32				0.0-2.0
	12-80	0-10	1.60-1.70	>20.00	0.02-0.04	7.4-8.4	1.0-6.0	10-45	Low------	0.10	0.37				0.0-1.0
Rn:															
Ross------------	0-10	15-27	1.20-1.45	0.60-2.00	0.19-0.24	6.1-7.8	12.0-26.0	---	Low------	0.32	0.32	5	5	56	3.0-5.0
	10-66	18-32	1.20-1.50	0.60-2.00	0.16-0.22	6.1-8.4	8.0-20.0	0-20	Low------	0.32	0.32				1.0-3.0
	66-80	5-25	1.35-1.60	0.60-6.00	0.05-0.18	6.1-8.4	2.0-15.0	0-30	Low------	0.32	0.49				0.5-2.0
Ro:															
Ross------------	0-10	27-32	1.25-1.50	0.60-2.00	0.18-0.22	6.1-8.4	17.0-29.0	---	Moderate	0.32	0.32	5	7	38	3.0-5.0
	10-34	18-32	1.20-1.50	0.60-2.00	0.16-0.22	6.1-8.4	8.0-20.0	0-20	Low------	0.32	0.32				1.0-3.0
	34-80	5-25	1.35-1.60	0.60-6.00	0.05-0.18	6.1-8.4	2.0-15.0	0-30	Low------	0.32	0.49				0.5-2.0
RuA:															
Rush------------	0-13	10-20	1.25-1.40	0.60-2.00	0.22-0.24	5.1-7.3	5.0-16.0	---	Low------	0.37	0.37	5	5	56	0.5-2.0
	13-39	22-30	1.35-1.50	0.60-2.00	0.18-0.20	4.5-6.5	9.0-20.0	---	Moderate	0.37	0.37				0.5-1.0
	39-46	20-30	1.40-1.55	0.60-2.00	0.15-0.19	4.5-6.5	9.0-20.0	---	Moderate	0.37	0.43				0.2-1.0
	46-58	8-10	1.40-1.55	0.60-2.00	0.04-0.10	6.6-7.8	3.0-7.0	0-10	Low------	0.24	0.64				0.0-0.5
	58-80	2-6	1.60-1.80	>20.00	0.02-0.04	7.4-8.4	1.0-5.0	10-35	Low------	0.10	0.37				0.0-0.5
ScA:															
Savona----------	0-10	10-25	1.25-1.45	0.60-2.00	0.20-0.24	5.1-7.3	10.0-21.0	---	Low------	0.37	0.37	4	5	56	0.5-3.0
	10-36	35-42	1.30-1.50	0.20-2.00	0.08-0.17	5.1-7.3	14.0-25.0	---	Moderate	0.37	0.43				0.3-1.0
	36-39	20-30	1.25-1.45	0.20-2.00	0.12-0.17	6.1-7.8	8.0-18.0	---	Low------	0.24	0.49				0.1-0.5
	39-47	20-35	1.25-1.45	0.60-2.00	0.10-0.17	7.4-8.4	8.0-21.0	10-50	Low------	0.24	0.55				0.1-0.5
	47-80	2-10	1.20-1.50	6.00-20.00	0.02-0.05	7.9-8.4	1.0-6.0	40-65	Low------	0.10	0.43				0.1-0.3
So:															
Sloan-----------	0-17	15-27	1.20-1.40	0.60-2.00	0.19-0.24	6.1-7.8	13.0-26.0	---	Low------	0.28	0.32	4	6	48	3.0-6.0
	17-31	20-35	1.25-1.55	0.20-2.00	0.17-0.20	6.1-8.4	10.0-18.0	0-10	Moderate	0.37	0.43				0.5-1.0
	31-56	10-30	1.25-1.55	0.20-2.00	0.19-0.21	6.6-8.4	5.0-15.0	0-20	Low------	0.37	0.43				0.3-1.0
	56-80	0-10	1.20-1.50	6.00-20.00	0.02-0.05	6.6-8.4	2.0-8.0	15-25	Low------	0.10	0.17				0.1-0.5
StB2:															
Strawn----------	0-6	27-30	1.35-1.55	0.60-2.00	0.18-0.20	5.6-7.3	18.0-22.0	---	Moderate	0.37	0.37	5	7	38	1.0-2.0
	6-20	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	20-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5
StC2:															
Strawn----------	0-6	27-30	1.35-1.55	0.60-2.00	0.18-0.20	5.6-7.3	18.0-22.0	---	Moderate	0.37	0.37	5	7	38	1.0-2.0
	6-20	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	20-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
StD2:															
Strawn----------	0-4	27-30	1.35-1.55	0.60-2.00	0.18-0.20	5.6-7.3	18.0-22.0	---	Moderate	0.37	0.37	5	7	38	1.0-2.0
	4-16	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	16-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5
StE2:															
Strawn----------	0-4	27-30	1.35-1.55	0.60-2.00	0.18-0.20	5.6-7.3	18.0-22.0	---	Moderate	0.37	0.37	5	7	38	1.0-2.0
	4-15	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	15-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5
SuA:															
Strawn----------	0-9	18-27	1.15-1.45	0.60-2.00	0.20-0.24	6.1-7.3	13.0-22.0	---	Low------	0.37	0.37	5	6	48	1.0-3.0
	9-18	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	18-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5
Crosby----------	0-9	10-24	1.30-1.60	0.60-2.00	0.18-0.24	5.1-7.3	6.0-20.0	---	Low------	0.43	0.43	4	5	56	1.0-3.0
	9-25	35-45	1.45-1.65	0.60-2.00	0.11-0.16	5.1-7.3	15.0-29.0	---	Moderate	0.28	0.32				0.5-1.0
	25-80	10-25	1.75-1.95	0.01-0.20	0.02-0.04	7.4-8.4	4.0-16.0	20-50	Low------	0.32	0.43				0.0-0.5
SuB:															
Strawn----------	0-10	18-27	1.15-1.45	0.60-2.00	0.20-0.24	6.1-7.3	13.0-22.0	---	Low------	0.37	0.37	5	6	48	1.0-3.0
	10-17	27-35	1.35-1.55	0.60-2.00	0.15-0.20	5.6-7.8	16.0-23.0	---	Moderate	0.37	0.43				0.2-1.0
	17-80	22-30	1.50-1.70	0.20-0.60	0.08-0.12	7.4-8.4	12.0-19.0	5-30	Low------	0.32	0.32				0.2-0.5
Crosby----------	0-10	10-24	1.30-1.60	0.60-2.00	0.18-0.24	5.1-7.3	6.0-20.0	---	Low------	0.43	0.43	4	5	56	1.0-3.0
	10-30	35-45	1.45-1.65	0.60-2.00	0.11-0.16	5.1-7.3	15.0-29.0	---	Moderate	0.28	0.32				0.5-1.0
	30-80	10-25	1.75-1.95	0.01-0.20	0.02-0.04	7.4-8.4	4.0-16.0	20-50	Low------	0.32	0.43				0.0-0.5
ThA:															
Thackery--------	0-11	15-25	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	8.0-21.0	---	Low------	0.37	0.37	4	5	56	1.0-3.0
	11-16	20-30	1.30-1.55	0.60-2.00	0.17-0.22	5.1-6.5	8.0-20.0	---	Low------	0.37	0.37				0.5-1.0
	16-36	25-35	1.35-1.60	0.60-2.00	0.13-0.18	5.1-7.8	10.0-21.0	---	Moderate	0.37	0.43				0.3-0.5
	36-53	15-27	1.25-1.55	2.00-6.00	0.04-0.10	6.1-7.8	6.0-16.0	10-45	Low------	0.10	0.24				0.2-0.5
	53-80	2-12	1.60-1.80	6.00-20.00	0.02-0.06	7.4-7.8	1.0-6.0	30-55	Low------	0.10	0.49				0.1-0.3
Tr:															
Tremont---------	0-7	27-35	1.25-1.50	0.60-2.00	0.20-0.23	7.4-8.4	20.0-24.0	5-15	Low------	0.28	0.28	4	4L	86	4.0-7.0
	7-29	22-35	1.25-1.50	0.60-2.00	0.18-0.22	7.4-8.4	16.0-24.0	3-12	Moderate	0.28	0.24				2.0-5.0
	29-54	18-32	1.35-1.55	0.60-2.00	0.15-0.22	7.4-8.4	16.0-24.0	3-12	Low------	0.32	0.37				0.1-1.0
	54-80	5-15	1.50-1.75	2.00-6.00	0.06-0.12	7.4-8.4	6.0-12.0	40-60	Low------	0.32	0.37				0.1-0.5
Ts:															
Tremont---------	0-18	20-27	1.20-1.45	0.60-2.00	0.20-0.24	7.4-8.4	20.0-24.0	5-15	Low------	0.28	0.28	4	4L	86	4.0-7.0
	18-28	22-35	1.25-1.50	0.60-2.00	0.18-0.22	7.4-8.4	16.0-24.0	3-12	Moderate	0.28	0.24				2.0-5.0
	28-40	18-32	1.35-1.55	0.60-2.00	0.15-0.22	7.4-8.4	16.0-24.0	3-12	Low------	0.32	0.37				0.1-1.0
	40-80	5-15	1.50-1.75	2.00-6.00	0.06-0.12	7.4-8.4	6.0-12.0	40-60	Low------	0.32	0.37				0.1-0.5

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Cation- exchange capacity	Calcium carbonate	Shrink- swell potential	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	meq/100g	Pct							Pct
Ud:															
Udorthents.															
Ur:															
Urban land.															
Wc:															
Wallkill---------	0-6	10-27	1.15-1.40	0.60-2.00	0.16-0.21	5.1-7.8	14.0-40.0	---	Low-------	0.37	0.37	5	5	56	4.0-12
	6-19	15-27	1.15-1.45	0.60-2.00	0.15-0.20	5.1-7.8	14.0-40.0	---	Low-------	0.37	0.37				---
	19-53	---	0.25-0.45	2.00-20.00	0.35-0.45	5.1-7.8	125-200	---	----------	---	---				---
	53-80	---	0.25-0.45	2.00-20.00	0.35-0.45	5.6-7.8	125-200	---	----------	---	---				---
WeA:															
Warsaw-----------	0-12	15-25	1.30-1.50	0.60-2.00	0.20-0.24	5.6-7.3	10.0-25.0	---	Low-------	0.28	0.28	4	5	56	2.0-5.0
	12-22	17-30	1.35-1.60	0.60-2.00	0.16-0.19	5.1-6.5	7.0-22.0	---	Low-------	0.28	0.32				0.5-2.0
	22-36	18-30	1.40-1.65	0.60-2.00	0.13-0.16	6.1-8.4	9.0-22.0	0-10	Low-------	0.28	0.43				0.5-2.0
	36-80	2-8	1.40-1.65	>20.00	0.02-0.04	7.9-8.4	1.0-7.0	15-25	Low-------	0.10	0.37				0.0-1.0
WpA:															
Waupecan---------	0-17	15-27	1.15-1.30	0.60-2.00	0.22-0.24	5.1-7.8	17.0-26.0	---	Low-------	0.32	0.32	4	6	48	4.0-5.0
	17-35	25-35	1.30-1.50	0.60-2.00	0.18-0.22	5.1-7.3	16.0-23.0	---	Moderate	0.43	0.43				0.5-1.0
	35-48	10-25	1.55-1.75	2.00-6.00	0.08-0.18	5.1-7.3	6.0-16.0	---	Low-------	0.10	0.17				0.2-0.5
	48-80	3-10	1.60-1.80	>20.00	0.02-0.04	6.6-8.4	2.0-8.0	0-20	Low-------	0.10	0.15				0.2-0.5
WrA:															
Waynetown--------	0-11	10-20	1.30-1.45	0.60-2.00	0.22-0.24	5.1-7.3	5.0-16.0	---	Low-------	0.37	0.37	5	5	56	0.5-2.0
	11-34	27-35	1.55-1.65	0.60-2.00	0.18-0.22	5.6-6.5	10.0-21.0	---	Moderate	0.37	0.37				0.2-0.5
	34-45	20-35	1.40-1.65	0.60-2.00	0.13-0.17	5.6-7.3	8.0-17.0	---	Moderate	0.37	0.37				0.1-0.5
	45-66	20-30	1.50-1.65	0.60-2.00	0.06-0.13	6.6-8.4	8.0-18.0	0-10	Moderate	0.28	0.49				0.1-0.5
	66-80	1-5	1.60-1.80	>20.00	0.02-0.04	7.9-8.4	1.0-5.0	20-30	Low-------	0.10	0.24				0.1-0.5
Wt:															
Westland---------	0-11	27-34	1.40-1.60	0.60-2.00	0.20-0.23	6.1-7.3	15.0-31.0	---	Moderate	0.24	0.24	4	7	38	2.0-5.0
	11-35	5-28	1.40-1.65	0.60-2.00	0.13-0.19	6.1-7.3	9.0-22.0	---	Moderate	0.28	0.32				0.5-2.0
	35-51	5-18	1.55-1.70	0.60-2.00	0.07-0.17	6.6-7.8	3.0-15.0	0-25	Low-------	0.24	0.37				0.5-2.0
	51-80	1-10	1.70-2.10	>20.00	0.01-0.04	7.4-8.4	0.0-2.0	25-45	Low-------	0.05	0.10				0.0-0.5

Table 17.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
Ad, Ae:							
Adrian	>60	---	6-18	29-33	High	High	Moderate.
Ca, Cb:							
Carlisle	>60	---	---	43-54	High	High	Low.
CcD2:							
Casco	>60	---	---	---	Low	Moderate	Low.
CeA, CeB:							
Celina	>60	---	---	---	High	High	Moderate.
ChA, ChB:							
Celina	>60	---	---	---	High	High	Moderate.
Strawn	>60	---	---	---	Moderate	Moderate	Moderate.
CrA, CrB:							
Crosby	>60	---	---	---	High	High	Moderate.
DoE:							
Donnelsville	40-60	Hard	---	---	Moderate	Low	Low.
DpF:							
Donnelsville	40-60	Hard	---	---	Moderate	Low	Low.
Rock outcrop.							
Dr:							
Drummer	>60	---	---	---	High	High	Moderate.
EmA, EmB, EmB2, EmC2:							
Eldean	>60	---	---	---	Moderate	High	Moderate.
EnC2:							
Eldean	>60	---	---	---	Moderate	High	Moderate.
Casco	>60	---	---	---	Low	Moderate	Low.
EpB2, EpC2, EpC3, EpD2, EpD3, EpE2:							
Eldean	>60	---	---	---	Moderate	High	Moderate.
Miamian	>60	---	---	---	Moderate	Moderate	Moderate.
EsE3:							
Eldean	>60	---	---	---	Moderate	High	Moderate.
Rodman	>60	---	---	---	Low	Low	Low.
EuB, EuC:							
Eldean	>60	---	---	---	Moderate	High	Moderate.
Urban land.							

Table 17.--Soil Features--Continued

Map symbol and soil name	Bedrock: Depth	Bedrock: Hardness	Subsidence: Initial	Subsidence: Total	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In		In	In			
Ge, Gn:							
Genesee	>60	---	---	---	Moderate	Low	Low.
Ko:							
Kokomo	>60	---	---	---	High	High	Moderate.
Lg, Lh:							
Linwood	>60	---	---	15-40	High	Moderate	Low.
Lm, Lp:							
Lippincott	>60	---	---	---	Moderate	High	Low.
Lu:							
Lippincott	>60	---	---	---	Moderate	High	Low.
Urban land.							
MgB2, MgC2, MgE2:							
Miamian	40-60	Hard	---	---	Moderate	Moderate	Moderate.
MhA, MhB, MhB2, MhC, MhC2, MhD2, MhE, MhE2, MkB2, MkC2, MkD2, MmC3, MmD3, MmE3:							
Miamian	>60	---	---	---	Moderate	Moderate	Moderate.
MnB, MnC:							
Miamian	>60	---	---	---	Moderate	Moderate	Moderate.
Urban land.							
Mo:							
Milford	>60	---	---	---	High	High	Low.
Ms:							
Millsdale	20-40	Hard	---	---	High	High	Low.
MtA, MtB, MvC2:							
Milton	20-40	Hard	---	---	Moderate	High	Moderate.
MxB:							
Milton	20-40	Hard	---	---	Moderate	High	Moderate.
Urban land.							
OcA, OcB:							
Ockley	>60	---	---	---	Moderate	Moderate	Moderate.
Pa:							
Patton	>60	---	---	---	High	High	Low.
Pg:							
Pits, gravel.							
Ph:							
Pits, quarry.							
RaA:							
Randolph	20-40	Hard	---	---	High	High	Moderate.

Table 17.--Soil Features--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
RgE:							
Rodman	>60	---	---	---	Low	Low	Low.
Rn, Ro:							
Ross	>60	---	---	---	Moderate	Low	Low.
RuA:							
Rush	>60	---	---	---	High	Moderate	Moderate.
ScA:							
Savona	>60	---	---	---	High	High	Low.
So:							
Sloan	>60	---	---	---	High	High	Low.
StB2, StC2, StD2, StE2:							
Strawn	>60	---	---	---	Moderate	Moderate	Moderate.
SuA, SuB:							
Strawn	>60	---	---	---	Moderate	Moderate	Moderate.
Crosby	>60	---	---	---	High	High	Moderate.
ThA:							
Thackery	>60	---	---	---	High	Moderate	Moderate.
Tr, Ts:							
Tremont	>60	---	---	---	High	Moderate	Low.
Ud:							
Udorthents	>60	---	---	---	Moderate	High	Moderate.
Ur:							
Urban land.							
Wc:							
Wallkill	>60	---	---	---	High	Moderate	Moderate.
WeA:							
Warsaw	>60	---	---	---	Moderate	Low	Moderate.
WpA:							
Waupecan	>60	---	---	---	High	Moderate	Moderate.
WrA:							
Waynetown	>60	---	---	---	High	High	Moderate.
Wt:							
Westland	>60	---	---	---	High	High	Low.

Table 18.--Water Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
Ad, Ae:									
Adrian----------	A/D	None-------	---	---	+1-1.0	Apparent---	Nov-May	Very long	1.0
Ca, Cb:									
Carlisle--------	A/D	None-------	---	---	+.5-1.0	Apparent---	Sep-Jun	Very long	0.5
CcD2:									
Casco-----------	B	None-------	---	---	>6.0	---	---	---	---
CeA, CeB:									
Celina----------	C	None-------	---	---	2.0-3.5	Perched----	Jan-Apr	---	---
ChA, ChB:									
Celina----------	C	None-------	---	---	2.0-3.5	Perched----	Jan-Apr	---	---
Strawn----------	B	None-------	---	---	>6.0	---	---	---	---
CrA, CrB:									
Crosby----------	C	None-------	---	---	0.5-1.5	Perched----	Dec-Apr	---	---
DoE:									
Donnelsville----	B	None-------	---	---	>6.0	---	---	---	---
DpF:									
Donnelsville----	B	None-------	---	---	>6.0	---	---	---	---
Rock outcrop.									
Dr:									
Drummer---------	B/D	None-------	---	---	+.5-2.0	Apparent---	Mar-Jun	Very long	0.5
EmA, EmB, EmB2, EmC2:									
Eldean---------	B	None-------	---	---	>6.0	---	---	---	---
EnC2:									
Eldean----------	B	None-------	---	---	>6.0	---	---	---	---
Casco-----------	B	None-------	---	---	>6.0	---	---	---	---
EpB2, EpC2, EpC3, EpD2, EpD3, EpE2:									
Eldean---------	B	None-------	---	---	>6.0	---	---	---	---
Miamian--------	C	None-------	---	---	>6.0	---	---	---	---
EsE3:									
Eldean----------	B	None-------	---	---	>6.0	---	---	---	---
Rodman----------	A	None-------	---	---	>6.0	---	---	---	---
EuB, EuC:									
Eldean----------	B	None-------	---	---	>6.0	---	---	---	---
Urban land.									

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
Ge:									
Genesee	B	Rare	---	---	3.0-6.0	Apparent	Jan-Apr	---	---
Gn:									
Genesee	B	Occasional	Brief	Nov-May	3.0-6.0	Apparent	Jan-Apr	---	---
Ko:									
Kokomo	B/D	None	---	---	+2-0.5	Apparent	Dec-May	Very long	2.0
Lg, Lh:									
Linwood	A/D	None	---	---	+1-1.0	Apparent	Nov-Jun	Very long	1.0
Lm, Lp:									
Lippincott	B/D	None	---	---	+1-1.0	Apparent	Dec-May	Very long	1.0
Lu:									
Lippincott	B/D	None	---	---	+1-1.0	Apparent	Dec-May	Very long	1.0
Urban land.									
MgB2, MgC2, MgE2, MhA, MhB, MhB2, MhC, MhC2, MhD2, MhE, MhE2, MkB2, MkC2, MkD2, MmC3, MmD3, MmE3:									
Miamian	C	None	---	---	>6.0	---	---	---	---
MnB, MnC:									
Miamian	C	None	---	---	>6.0	---	---	---	---
Urban land.									
Mo:									
Milford	B/D	None	---	---	+.5-1.0	Apparent	Dec-Jun	Very long	0.5
Ms:									
Millsdale	C/D	None	---	---	+1-1.0	Perched	Jan-Apr	Very long	1.0
MtA, MtB, MvC2:									
Milton	C	None	---	---	>6.0	---	---	---	---
MxB:									
Milton	C	None	---	---	>6.0	---	---	---	---
Urban land.									
OcA, OcB:									
Ockley	B	None	---	---	>6.0	---	---	---	---
Pa:									
Patton	B/D	None	---	---	+.5-2.0	Apparent	Mar-Jun	Very long	0.5
Pg:									
Pits, gravel.									
Ph:									
Pits, quarry.									

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
RaA:									
Randolph	C	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
RgE:									
Rodman	A	None	---	---	>6.0	---	---	---	---
Rn:									
Ross	B	Occasional	Brief	Nov-Jun	4.0-6.0	Apparent	Feb-Apr	---	---
Ro:									
Ross	B	Rare	---	---	4.0-6.0	Apparent	Feb-Apr	---	---
RuA:									
Rush	B	None	---	---	>6.0	---	---	---	---
ScA:									
Savona	C	None	---	---	1.0-2.5	Apparent	Dec-Apr	---	---
So:									
Sloan	B/D	Occasional	Brief	Nov-Jun	0.0-1.0	Apparent	Nov-Jun	---	---
StB2, StC2, StD2, StE2:									
Strawn	B	None	---	---	>6.0	---	---	---	---
SuA, SuB:									
Strawn	B	None	---	---	>6.0	---	---	---	---
Crosby	C	None	---	---	0.5-1.5	Perched	Dec-Apr	---	---
ThA:									
Thackery	B	None	---	---	2.0-3.5	Apparent	Jan-Apr	---	---
Tr:									
Tremont	B	Rare	---	---	1.5-3.0	Apparent	Jan-Apr	---	---
Ts:									
Tremont	B	Occasional	Brief	Nov-Jun	1.5-3.0	Apparent	Jan-Apr	---	---
Ud:									
Udorthents	B	None	---	---	>6.0	---	---	---	---
Ur:									
Urban land.									
Wc:									
Wallkill	C/D	Occasional	Very long	Sep-Jun	+.5-1.0	Apparent	Sep-Jun	Very long	0.5
WeA:									
Warsaw	B	None	---	---	>6.0	---	---	---	---
WpA:									
Waupecan	B	None	---	---	>6.0	---	---	---	---
WrA:									
Waynetown	C	None	---	---	0.5-2.0	Apparent	Dec-May	---	---
Wt:									
Westland	B/D	None	---	---	+1-1.0	Apparent	Dec-May	Very long	1.0

Interpretive Groups

Interpretive Groups

(Unless otherwise indicated, a complex is treated as a single management unit in the "Land capability," "Pasture and hayland," and "Prime farmland" columns. See text for definitions of the groups. Absence of an entry indicates that the soil is not suited to the intended use or is not rated)

Map symbol and soil name	Land capability	Pasture and hayland	Prime farmland	Woodland ordination symbol
Ad---------------Adrian	IVw	D-1	No	4W
Ae---------------Adrian	Vw	D-1	No	4W
Ca---------------Carlisle	IIIw	D-1	No	6W
Cb---------------Carlisle	Vw	D-1	No	6W
CcD2-------------Casco	VIe	B-1	No	4R
CeA--------------Celina	I	A-6	Yes	5A
CeB--------------Celina	IIe	A-6	Yes	5A
ChA--------------:	I	A-6	Yes	
Celina----------				5A
Strawn----------				4A
ChB--------------:	IIe	A-6	Yes	
Celina----------				5A
Strawn----------				4A
CrA--------------Crosby	IIw	C-1	Yes*	5D
CrB--------------Crosby	IIe	C-1	Yes*	5D
DoE--------------Donnelsville	VIe	A-4	No	2R
DpF:				
Donnelsville----	VIIe	A-4	No	2R
Rock outcrop.				
Dr---------------Drummer	IIw	C-1	Yes*	---
EmA--------------Eldean	IIs	A-1	Yes	4A
EmB, EmB2--------Eldean	IIe	A-1	Yes	4A

See footnote at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Pasture and hayland	Prime farmland	Woodland ordination symbol
EmC2	IIIe	A-1	No	4A
Eldean				
EnC2	IIIe	A-1	No	
Eldean				4A
Casco				4S
EpB2	IIe	A-1	Yes	
Eldean				4A
Miamian				5A
EpC2	IIIe	A-1	No	
Eldean				4A
Miamian				5A
EpC3	IVe	A-1	No	
Eldean				4A
Miamian				5A
EpD2	IVe	A-1	No	
Eldean				4R
Miamian				5R
EpD3	VIe	A-1	No	
Eldean				4R
Miamian				5R
EpE2	VIe	A-2	No	
Eldean				4R
Miamian				5R
EsE3	VIe	A-2	No	
Eldean				4R
Rodman				4R
EuB, EuC:				
Eldean	---	---	No	---
Urban land.				
Ge, Gn	IIw	A-5	Yes	5A
Genesee				
Ko	IIw	C-1	Yes*	4W
Kokomo				
Lg	Vw	D-1	No	2W
Linwood				

See footnote at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Pasture and hayland	Prime farmland	Woodland ordination symbol
Lh: Linwood	IIw	D-1	No	2W
Lm, Lp: Lippincott	IIw	C-1	Yes*	4W
Lu:				
Lippincott	---	---	No	---
Urban land.				
MgB2: Miamian	IIe	A-1	Yes	5A
MgC2: Miamian	IIIe	A-1	No	5A
MgE2: Miamian	VIe	A-2	No	5A
MhA: Miamian	I	A-1	Yes	5A
MhB, MhB2: Miamian	IIe	A-1	Yes	5A
MhC, MhC2: Miamian	IIIe	A-1	No	5A
MhD2: Miamian	IVe	A-1	No	5R
MhE, MhE2: Miamian	VIe	A-2	No	5R
MkB2: Miamian	IIe	A-1	Yes	5A
MkC2: Miamian	IIIe	A-1	No	5A
MkD2: Miamian	IVe	A-1	No	5R
MmC3: Miamian	IVe	A-1	No	5A
MmD3: Miamian	VIe	A-1	No	5R
MmE3: Miamian	VIe	A-2	No	5R
MnB, MnC:				
Miamian	---	---	No	---
Urban land.				
Mo: Milford	IIIw	C-1	Yes*	---

See footnote at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Pasture and hayland	Prime farmland	Woodland ordination symbol
Ms--------------- Millsdale	IIIw	C-2	Yes*	5W
MtA-------------- Milton	IIs	F-1	Yes	4D
MtB-------------- Milton	IIe	F-1	Yes	4D
MvC2------------- Milton	IIIe	F-1	No	4D
MxB:				
Milton----------	---	---	No	---
Urban land.				
OcA-------------- Ockley	I	A-1	Yes	5A
OcB-------------- Ockley	IIe	A-1	Yes	5A
Pa--------------- Patton	IIw	C-1	Yes*	4W
Pg. Pits, gravel				
Ph. Pits, quarry				
RaA-------------- Randolph	IIIw	C-2	Yes*	4A
RgE-------------- Rodman	VIIs	B-2	No	4R
Rn--------------- Ross	IIw	A-5	Yes	5A
Ro--------------- Ross	I	A-5	Yes	5A
RuA-------------- Rush	I	A-6	Yes	5A
ScA-------------- Savona	IIw	C-1	Yes*	4A
So--------------- Sloan	IIIw	C-3	Yes*	5W
StB2------------- Strawn	IIe	A-6	Yes	4A
StC2------------- Strawn	IIIe	A-6	No	4A

See footnote at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Pasture and hayland	Prime farmland	Woodland ordination symbol
StD2------------- Strawn	IVe	A-6	No	4R
StE2------------- Strawn	VIe	A-2	No	4R
SuA--------------	IIw	C-1	Yes*	
Strawn----------				4A
Crosby----------				5D
SuB--------------	IIe	A-6	Yes*	
Strawn----------				4A
Crosby----------				5D
ThA-------------- Thackery	I	A-6	Yes	5A
Tr--------------- Tremont	I	A-5	Yes	5A
Ts--------------- Tremont	IIw	A-5	Yes	5A
Ud. Udorthents				
Ur. Urban land				
Wc--------------- Wallkill	IIIw	D-1	No	2W
WeA-------------- Warsaw	IIs	A-1	Yes	---
WpA-------------- Waupecan	I	A-1	Yes	---
WrA-------------- Waynetown	IIw	C-1	Yes*	5A
Wt--------------- Westland	IIw	C-1	Yes*	5W

* Where drained.

NRCS Accessibility Statement

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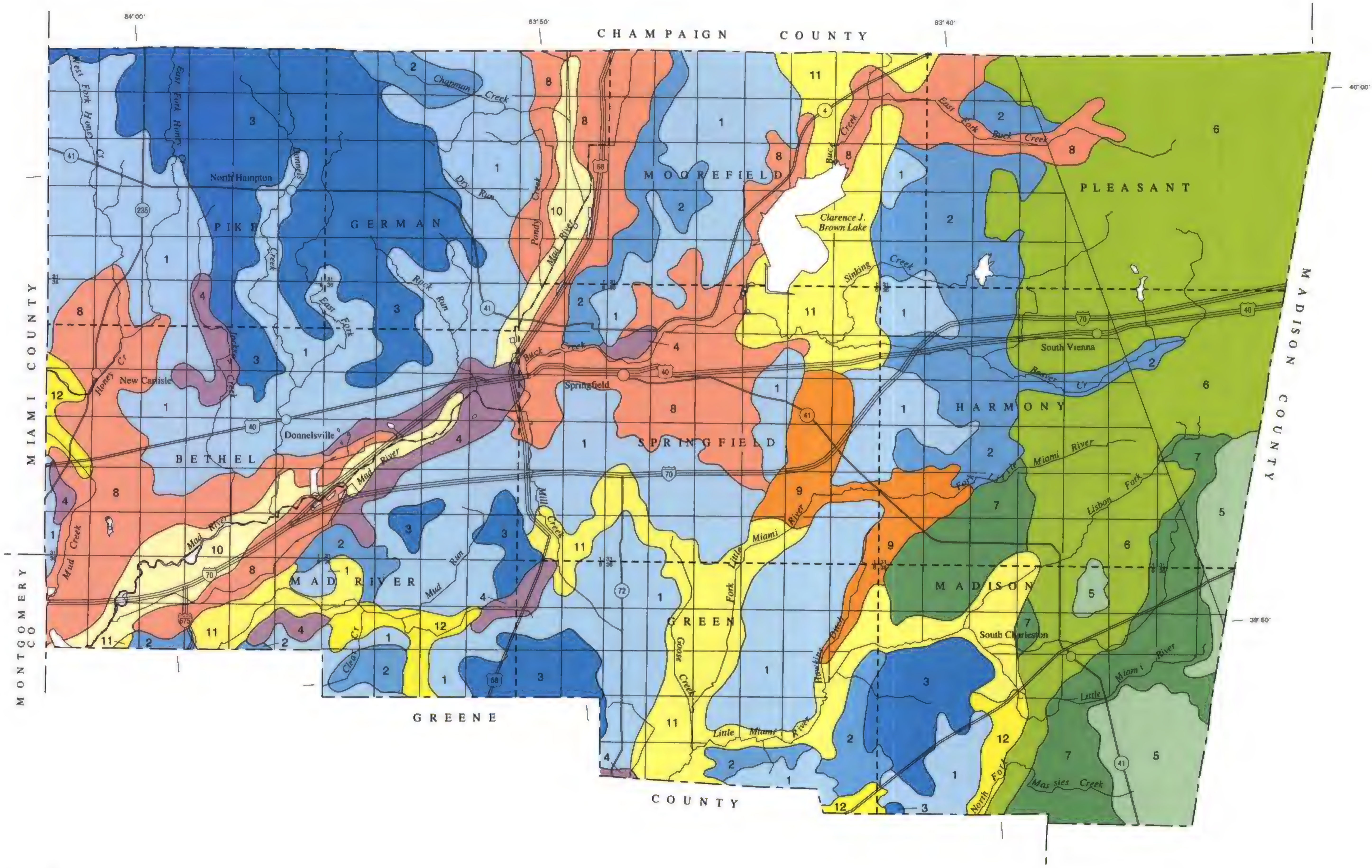


SOIL LEGEND*

VERY DEEP AND MODERATELY DEEP SOILS ON TILL PLAINS AND END MORAINES

1 Miamian-Kokomo-Celina Association

2 Miamian-Eldean-Kokomo Association

3 Crosby-Kokomo-Celina Association

4 Miamian-Milton-Millsdale Association

5 Kokomo-Strawn-Celina Association

6 Strawn-Kokomo Association

7 Kokomo-Strawn-Crosby Association

VERY DEEP SOILS ON OUTWASH PLAINS, STREAM TERRACES, VALLEY TRAINS, LAKE PLAINS, AND FLOOD PLAINS

8 Eldean-Lippincott Association

9 Drummer-Ockley-Eldean Association

10 Tremont-Ross-Sloan Association

11 Eldean-Ockley-Westland Association

12 Westland-Milford-Ockley Association

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1997

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF SOIL AND WATER CONSERVATION
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
OHIO STATE UNIVERSITY EXTENSION

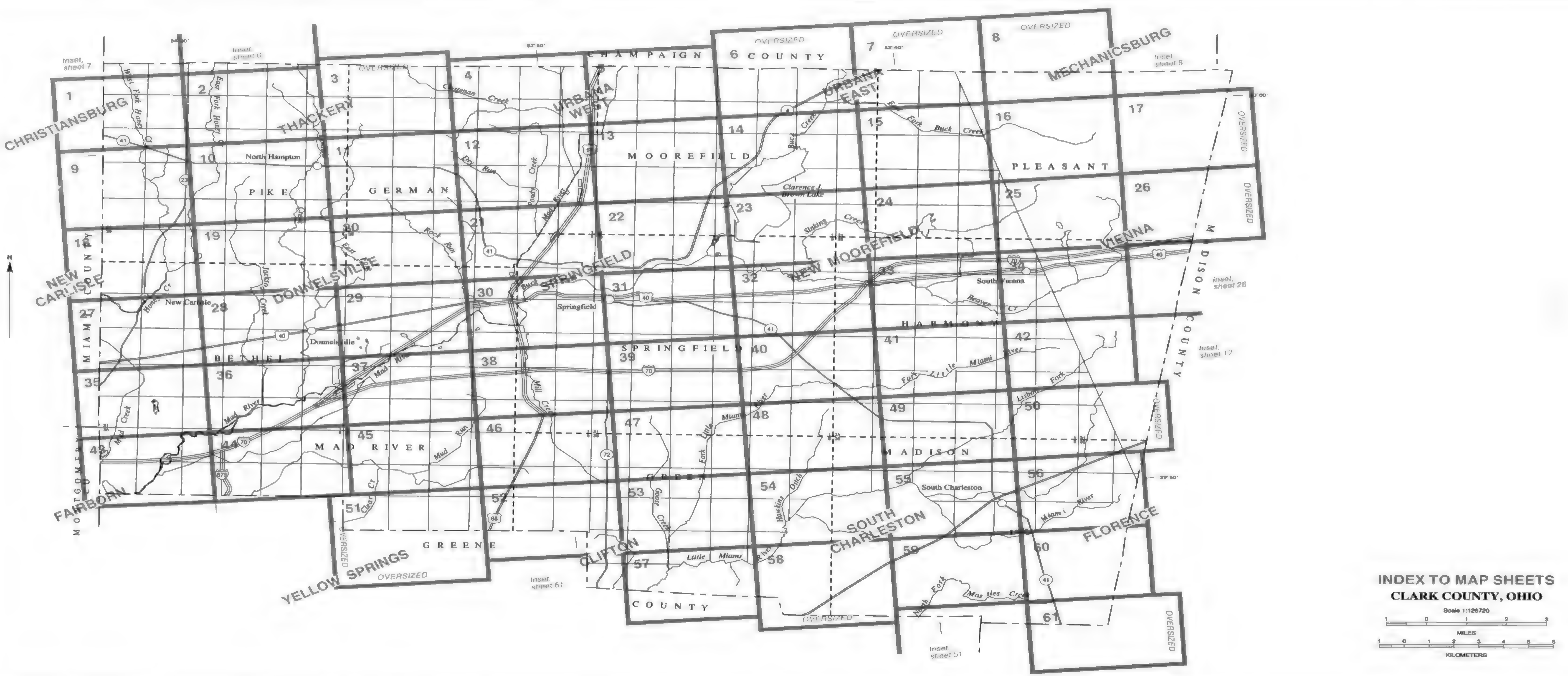
GENERAL SOIL MAP
CLARK COUNTY, OHIO

Scale 1:126720

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.


INDEX TO MAP SHEETS
CLARK COUNTY, OHIO
Scale 1:126720
MILES
KILOMETERS
CHAMPAIGN COUNTY
MIAMI COUNTY
MONTGOMERY CO
GREENE COUNTY
MADISON COUNTY
CHRISTIANSBURG
THACKERY
URBANA WEST
URBANA EAST
MECHANICSBURG
NEW CARLISLE
DONNELSVILLE
SPRINGFIELD
NEW MOOREFIELD
VIENNA
FAIRBORN
YELLOW SPRINGS
CLIFTON
SOUTH CHARLESTON
FLORENCE
PIKE
GERMAN
MOOREFIELD
PLEASANT
BETHEL
SPRINGFIELD
HARMONY
MAD RIVER
GREEN
MADISON
North Hampton
New Carlisle
Donnelsville
Springfield
South Vienna
South Charleston
Clarence J. Brown Lake
Inset, sheet 7
Inset, sheet 6
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Inset, sheet 26
Inset, sheet 17
Inset, sheet 61
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OVERSIZED
West Fork Honey Cr
East Fork Honey Cr
Chapman Creek
Dry Run
Pondy Creek
Mad River
Rock Run
East Fork Buck Creek
Buck Creek
Sinking Creek
Beaver Cr
Honey Cr
Jackson Creek
Mad Creek
Mud Run
Mill Creek
Clear Cr
Goose Creek
Little Miami River
Fork Little Miami River
Hawkins Ditch
Lisbon Fork
Miami River
North Fork Massies Creek
1
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3
4
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7
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11
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SOIL LEGEND

Map symbols consist of a combination of letters and numbers. The first capital letter is the initial one of the map unit name. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping or eroded phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for level, nearly level, and miscellaneous areas. A final number of 2 indicates that the soil is eroded, and 3 indicates that the soil is severely eroded.

SYMBOL	NAME
Ad	Adrian muck, drained
Ae	Adrian muck, undrained
Ca	Carlisle muck, drained
Cb	Carlisle muck, undrained
CcD2	Casco gravelly loam, 12 to 20 percent slopes, eroded
CeA	Celina silt loam, 0 to 2 percent slopes
CeB	Celina silt loam, 2 to 6 percent slopes
ChA	Celina-Strawn complex, 0 to 2 percent slopes
ChB	Celina-Strawn complex, 2 to 6 percent slopes
CrA	Crosby silt loam, 0 to 2 percent slopes
CrB	Crosby silt loam, 2 to 6 percent slopes
DoE	Donnelsville channery silt loam, 18 to 30 percent slopes
DpF	Donnelsville-Rock outcrop complex, 30 to 70 percent slopes
Dr	Drummer silty clay loam, gravelly substratum
EmA	Eldean silt loam, 0 to 2 percent slopes
EmB	Eldean silt loam, 2 to 6 percent slopes
EmB2	Eldean silt loam, 2 to 6 percent slopes, eroded
EmC2	Eldean silt loam, 6 to 12 percent slopes, eroded
EnC2	Eldean-Casco complex, 6 to 12 percent slopes, eroded
EpB2	Eldean-Miamian complex, 2 to 6 percent slopes, eroded
EpC2	Eldean-Miamian complex, 6 to 12 percent slopes, eroded
EpC3	Eldean-Miamian complex, 6 to 12 percent slopes, severely eroded
EpD2	Eldean-Miamian complex, 12 to 18 percent slopes, eroded
EpD3	Eldean-Miamian complex, 12 to 18 percent slopes, severely eroded
EpE2	Eldean-Miamian complex, 18 to 30 percent slopes, eroded
EsE3	Eldean-Rodman complex, 18 to 30 percent slopes, severely eroded
EuB	Eldean-Urban land complex, 2 to 6 percent slopes
EuC	Eldean-Urban land complex, 6 to 12 percent slopes
Ge	Genesee silt loam, till substratum, rarely flooded
Gn	Genesee silt loam, till substratum, occasionally flooded
Ko	Kokomo silty clay loam
Lg	Linwood muck, undrained
Lh	Linwood mucky silt loam, drained
Lm	Lippincott mucky silt loam
Lp	Lippincott silty clay loam
Lu	Lippincott-Urban land complex
MgB2	Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded
MgC2	Miamian silty clay loam, limestone substratum, 6 to 12 percent slopes, eroded
MgE2	Miamian silty clay loam, limestone substratum, 18 to 30 percent slopes, eroded
MhA	Miamian silt loam, 0 to 2 percent slopes
MhB	Miamian silt loam, 2 to 6 percent slopes
MhB2	Miamian silt loam, 2 to 6 percent slopes, eroded
MhC	Miamian silt loam, 6 to 12 percent slopes
MhC2	Miamian silt loam, 6 to 12 percent slopes, eroded
MhD2	Miamian silt loam, 12 to 18 percent slopes, eroded
MhE	Miamian silt loam, 18 to 30 percent slopes
MhE2	Miamian silt loam, 18 to 30 percent slopes, eroded
MkB2	Miamian silty clay loam, 2 to 6 percent slopes, eroded
MkC2	Miamian silty clay loam, 6 to 12 percent slopes, eroded
MkD2	Miamian silty clay loam, 12 to 18 percent slopes, eroded
MmC3	Miamian clay loam, 6 to 12 percent slopes, severely eroded
MmD3	Miamian clay loam, 12 to 18 percent slopes, severely eroded
MmE3	Miamian clay loam, 18 to 30 percent slopes, severely eroded
MnB	Miamian-Urban land complex, 2 to 6 percent slopes
MnC	Miamian-Urban land complex, 6 to 12 percent slopes
Mo	Milford silty clay loam, sandy substratum
Ms	Millsdale silty clay loam
MtA	Milton silt loam, 0 to 2 percent slopes
MtB	Milton silt loam, 2 to 6 percent slopes
MvC2	Milton silty clay loam, 6 to 12 percent slopes, eroded
MxB	Milton-Urban land complex, 2 to 6 percent slopes
OcA	Ockley silt loam, 0 to 2 percent slopes
OcB	Ockley silt loam, 2 to 6 percent slopes
Pa	Patton silty clay loam
Pg	Pits, gravel
Ph	Pits, quarry
RaA	Randolph silt loam, 0 to 2 percent slopes
RgE	Rodman gravelly loam, 18 to 35 percent slopes
Rn	Ross silt loam, occasionally flooded
Ro	Ross silty clay loam, rarely flooded
RuA	Rush silt loam, 0 to 2 percent slopes
ScA	Savona silt loam, 0 to 2 percent slopes
So	Sloan silt loam, sandy substratum, occasionally flooded
StB2	Strawn silty clay loam, 2 to 6 percent slopes, eroded
StC2	Strawn silty clay loam, 6 to 12 percent slopes, eroded
StD2	Strawn silty clay loam, 12 to 18 percent slopes, eroded
StE2	Strawn silty clay loam, 18 to 35 percent slopes, eroded
SuA	Strawn-Crosby complex, 0 to 2 percent slopes
SuB	Strawn-Crosby complex, 2 to 6 percent slopes
ThA	Thackery silt loam, 0 to 2 percent slopes
Tr	Tremont silty clay loam, rarely flooded
Ts	Tremont silt loam, occasionally flooded
Ud	Udorthents, loamy
Ur	Urban land
W	Water
Wc	Wallkill silt loam, occasionally flooded
WeA	Warsaw silt loam, 0 to 3 percent slopes
WpA	Waupecan silt loam, 0 to 2 percent slopes
WrA	Waynetown silt loam, 0 to 2 percent slopes
Wt	Westland silty clay loam

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Minor civil division
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County (named)

RAILROAD (mainline only)

DAMS

- Large (to scale)
- Medium or Small (Named where applicable)

MISCELLANEOUS CULTURAL FEATURES

- Church
- School

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS CeB Ko

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

SOIL SAMPLE

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 1

SOIL SURVEY OF CLARK COUNTY, OHIO — SHEET NUMBER 2

CLARK COUNTY, OHIO NO. 2

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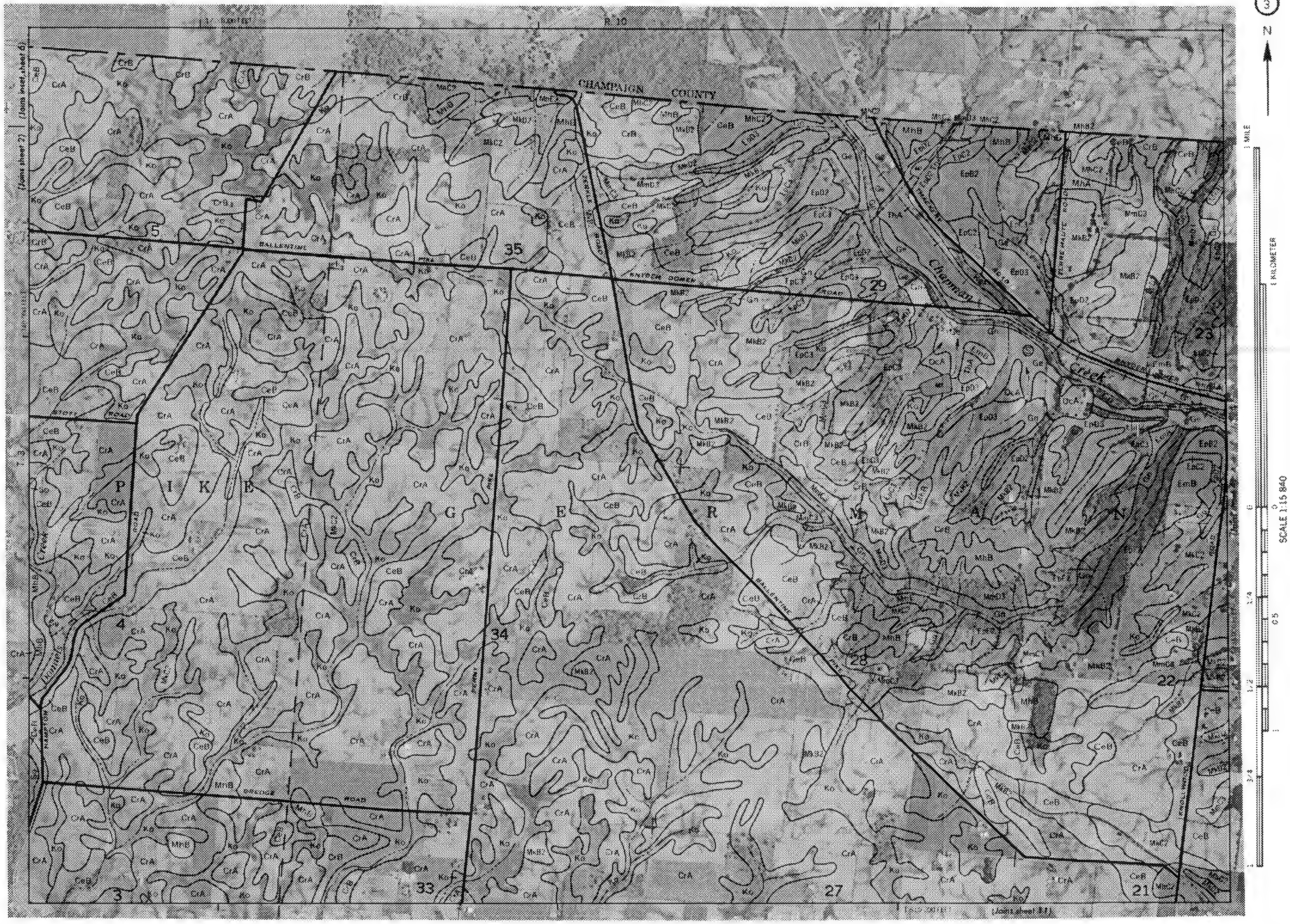

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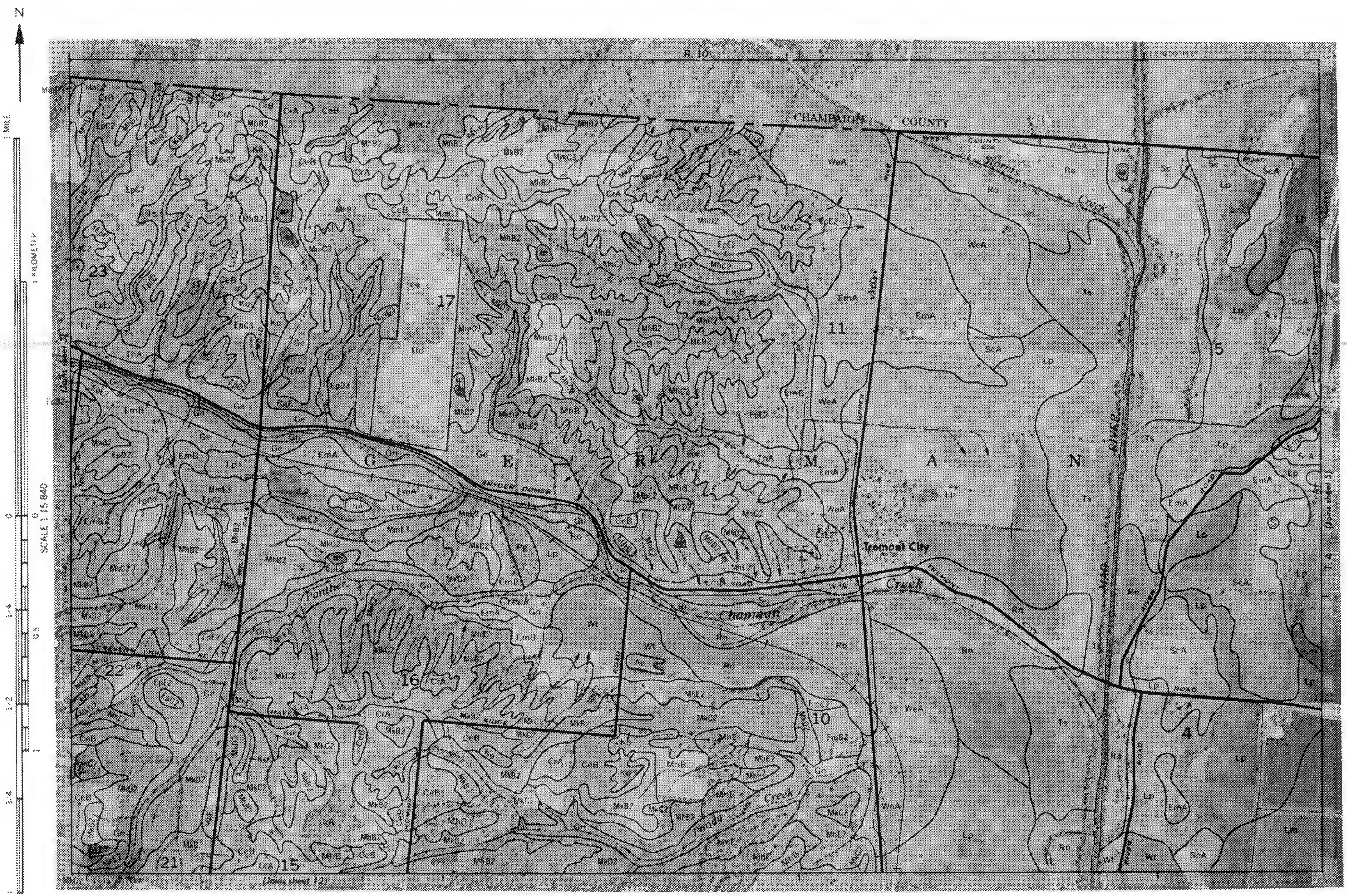
CLARK COUNTY, OHIO NO. 3

4



CLARK COUNTY, OHIO NO. 4

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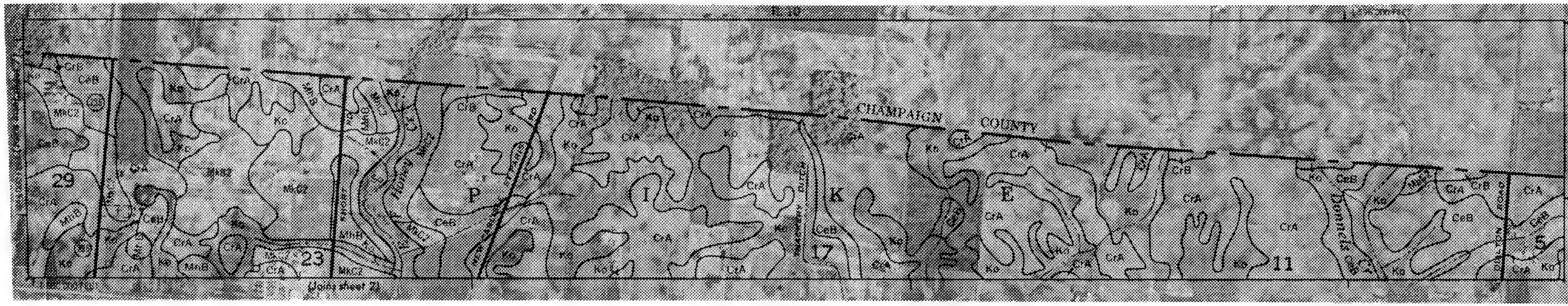
CLARK COUNTY, OHIO NO. 5

6

N



2000 AND 5000 FOOT GRID TICKS

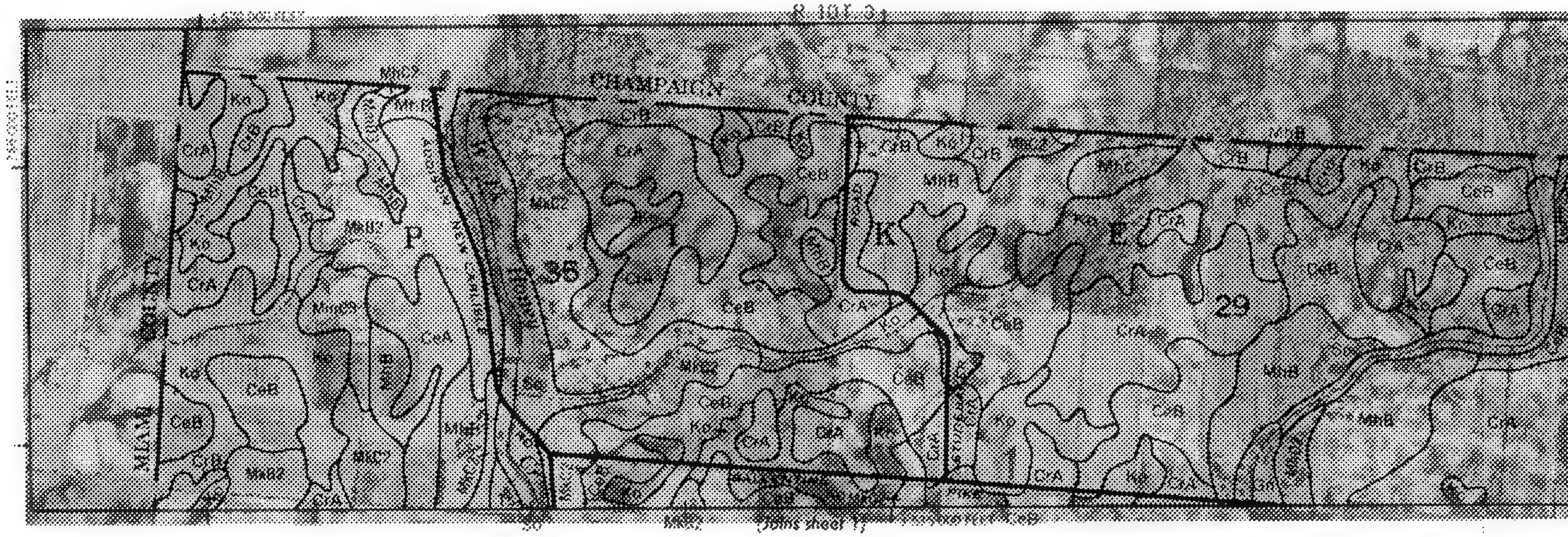
SCALE 1:15 840

CLARK COUNTY, OHIO NO. 6

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

7

N



2000 AND 5000-FOOT GRID TICKS

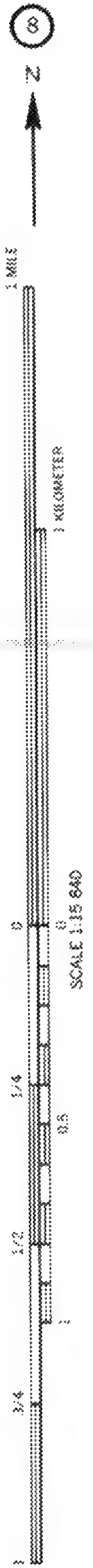
1 MILE

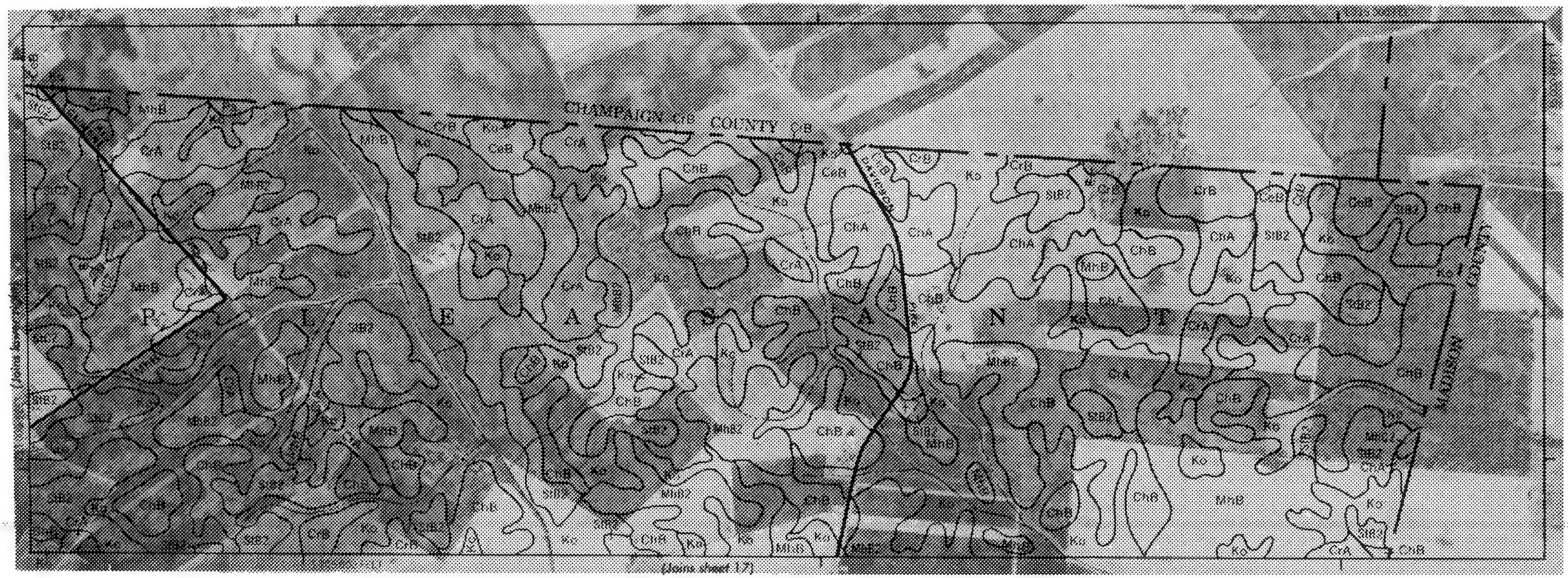
1 KILOMETER

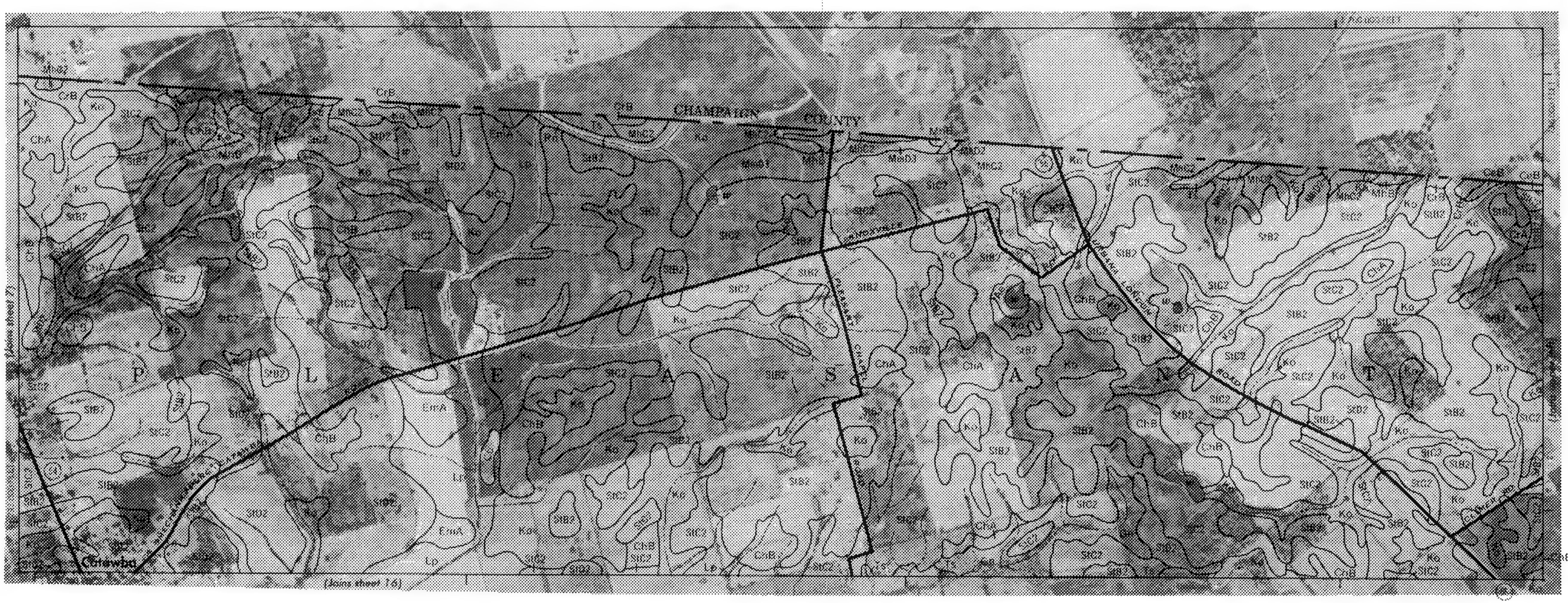
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 7







CLARK COUNTY, OHIO NO. 8

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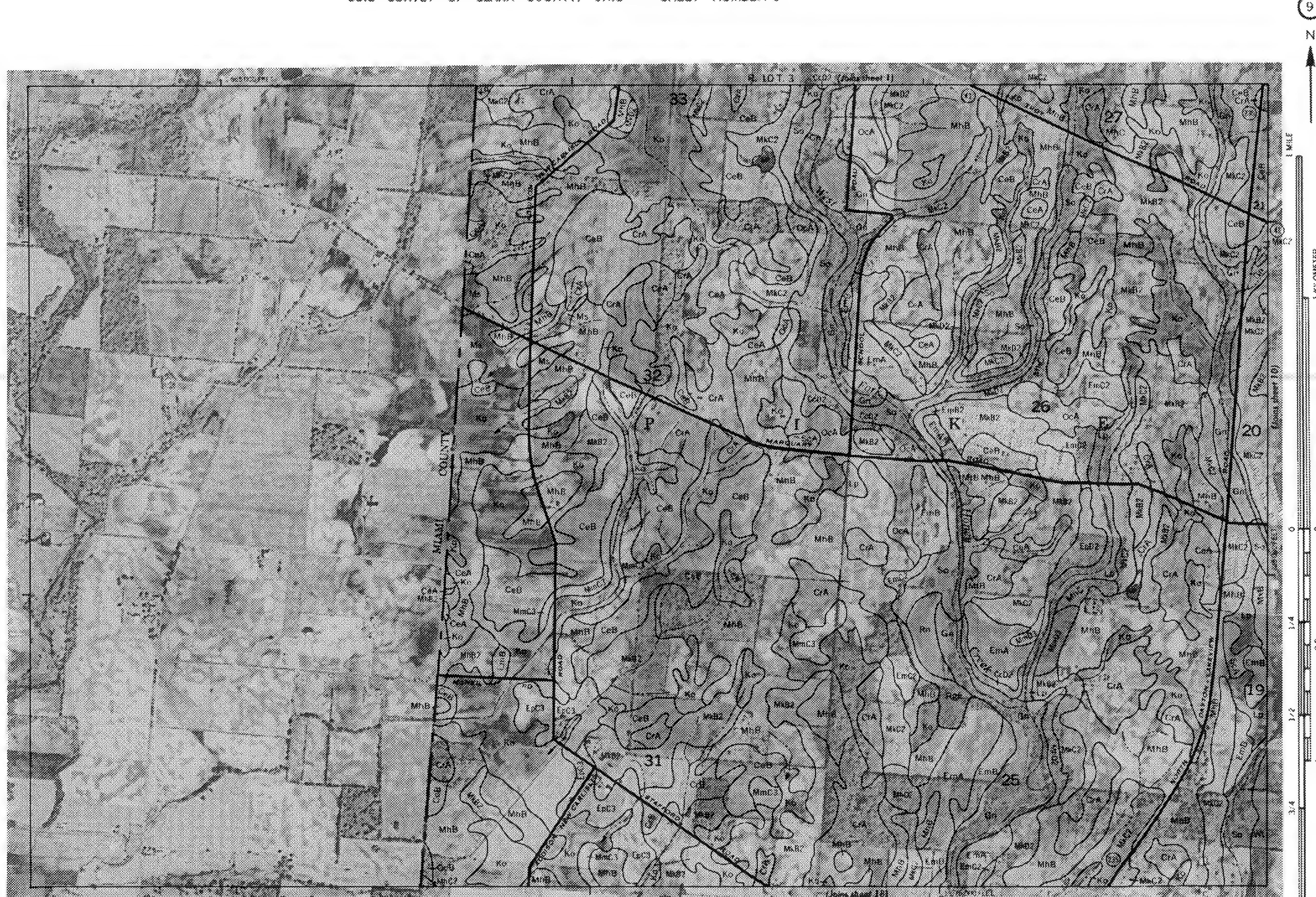
CLARK COUNTY, OHIO NO. 9



(10)

CLARK COUNTY, OHIO NO. 10

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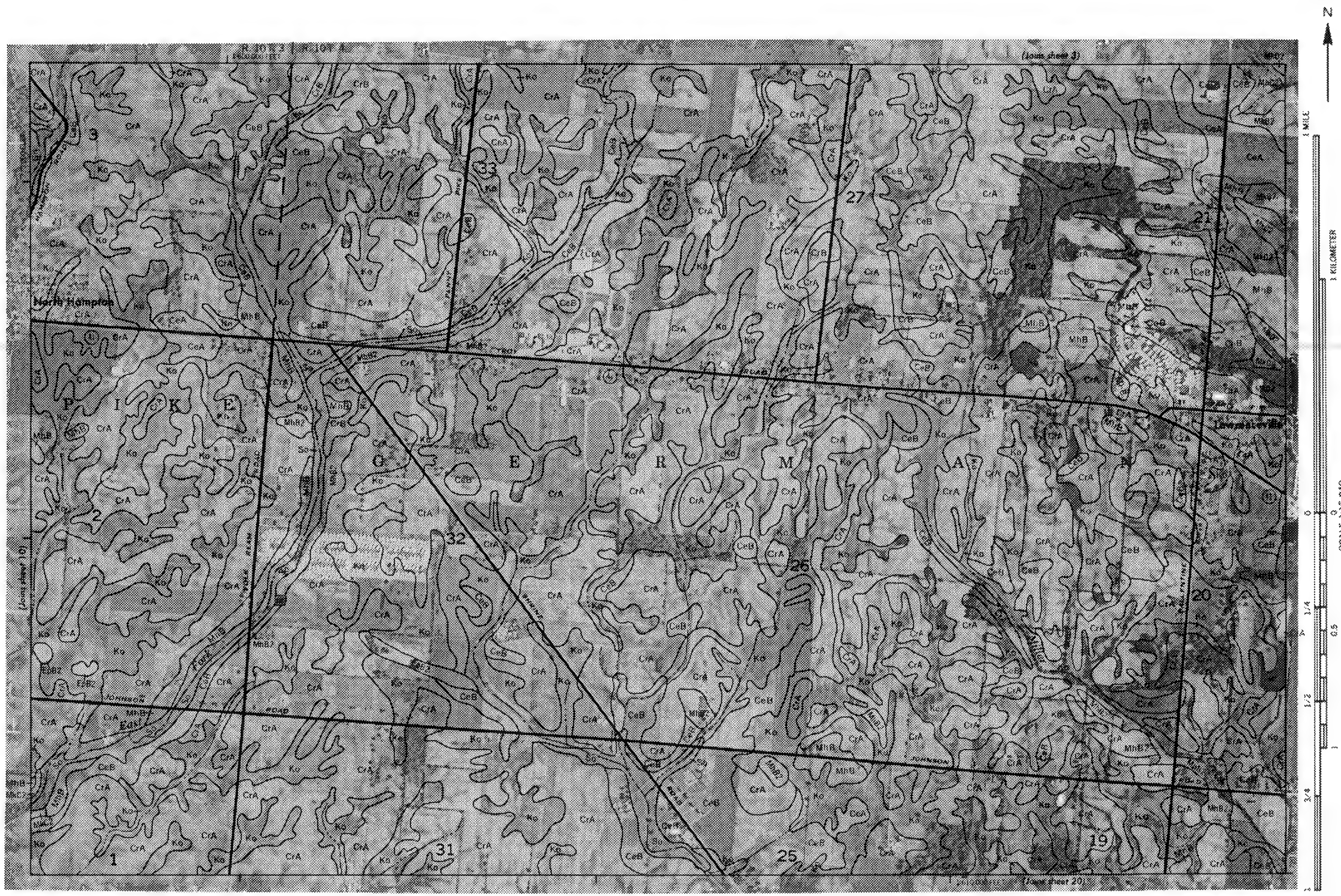
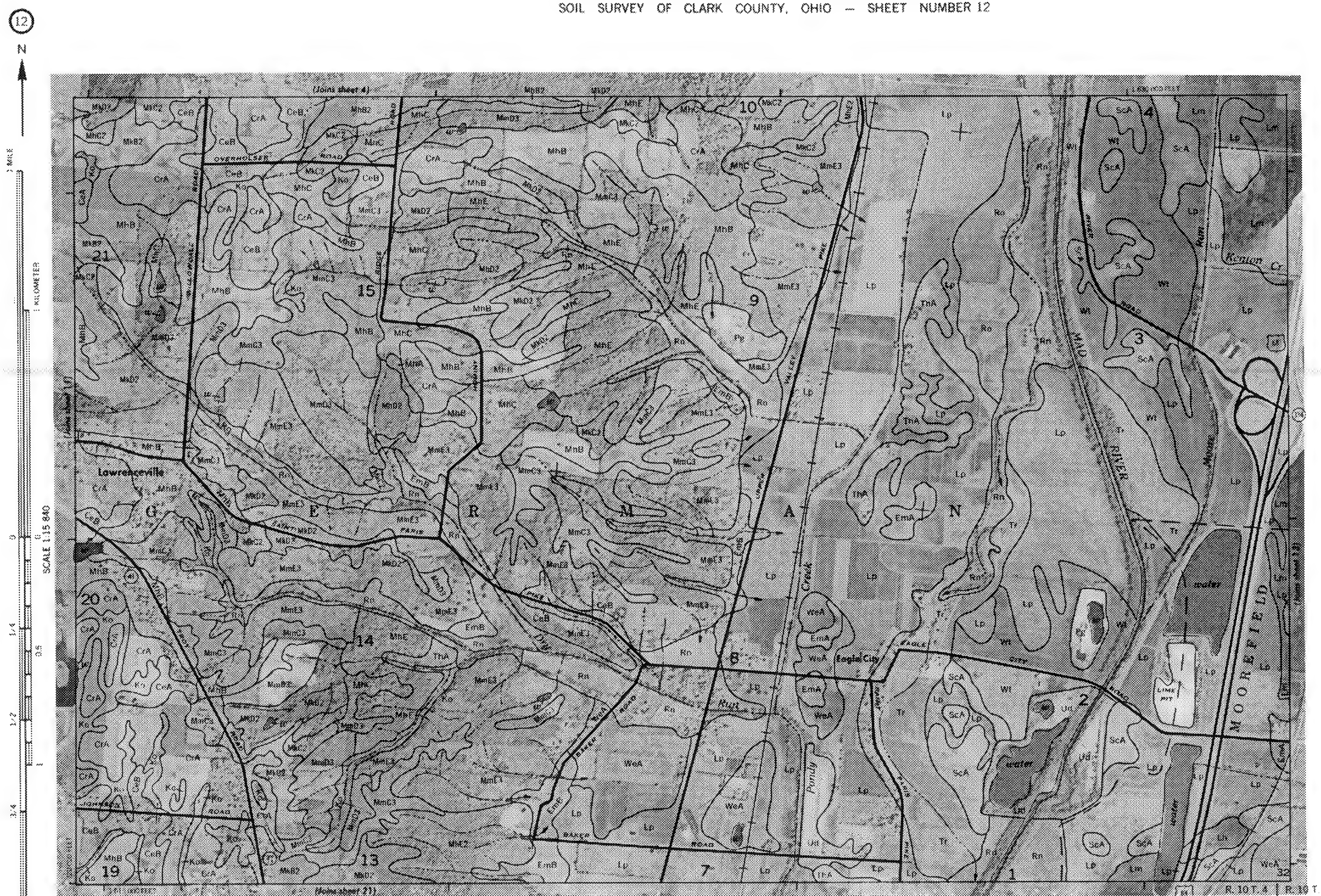
11

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1988 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 11





CLARK COUNTY, OHIO NO. 12

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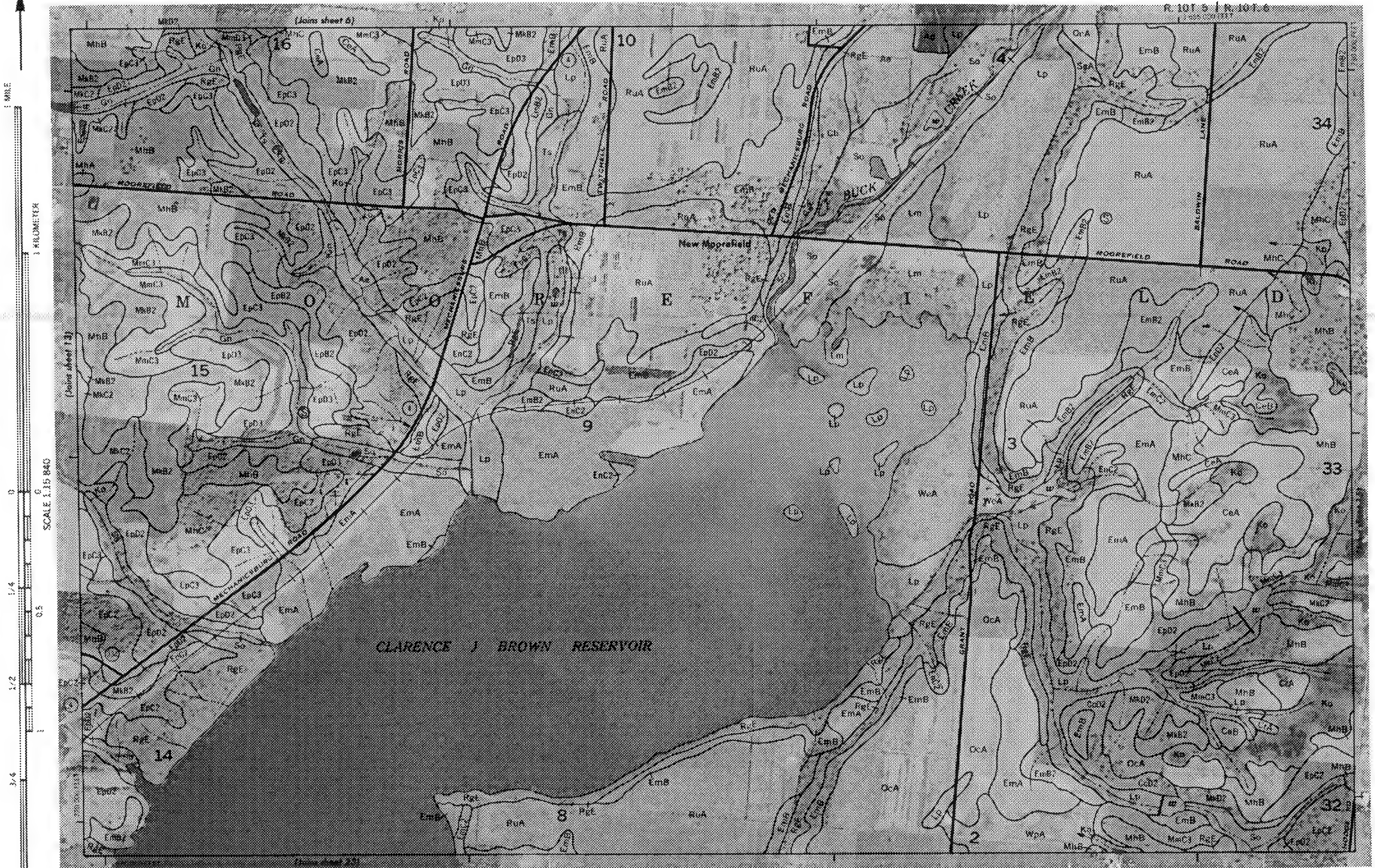
CLARK COUNTY, OHIO NO. 13

14

N



CLARK COUNTY, OHIO NO. 14

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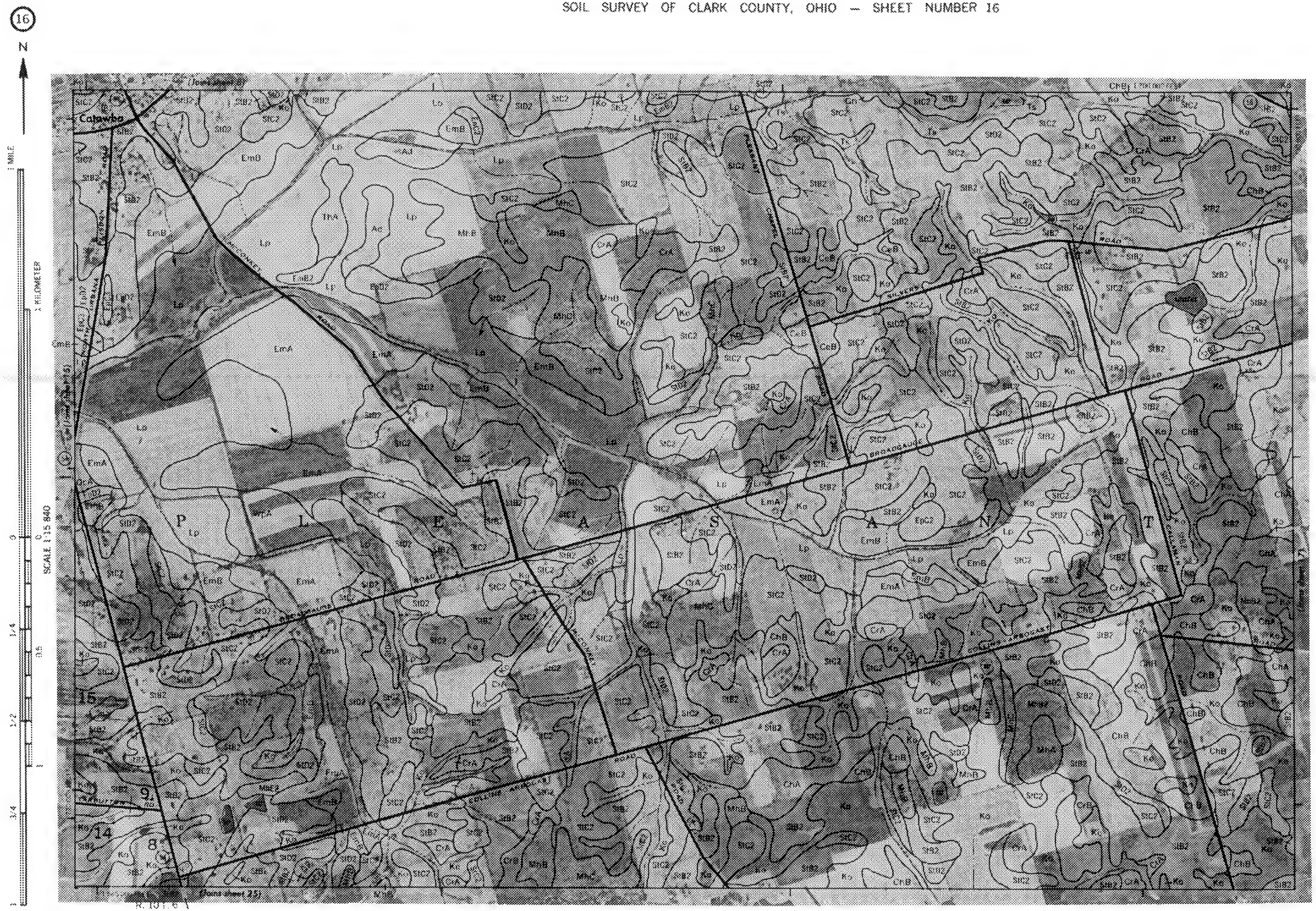
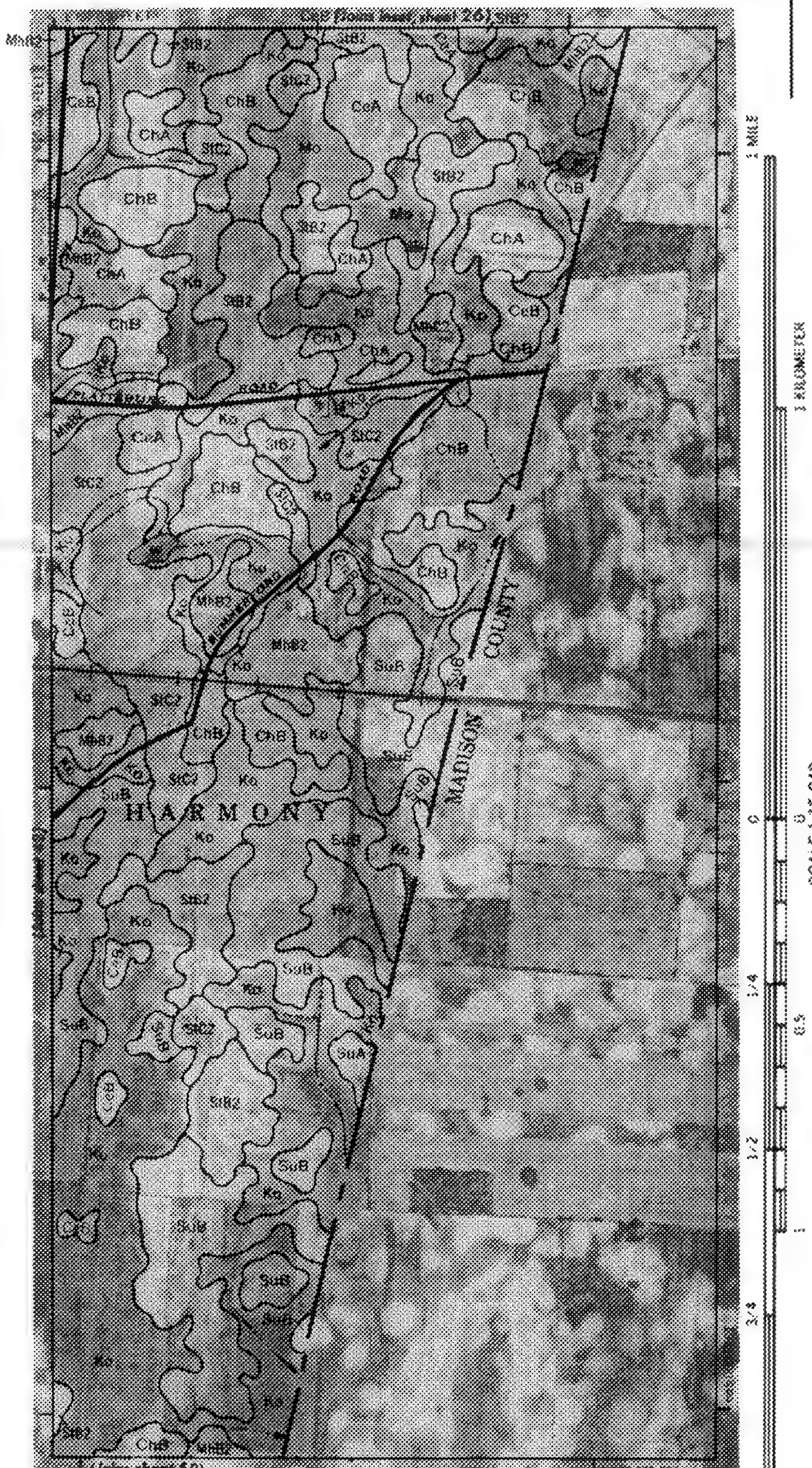
CLARK COUNTY, OHIO NO. 15



CLARK COUNTY, OHIO NO. 16

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

17



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CLARK COUNTY, OHIO NO. 17

N

1 MILE

1 KILOMETER

SCALE 1:15 840

0 1/4 1/2 3/4 1

0 0.5 1

CLARK COUNTY, OHIO NO. 18

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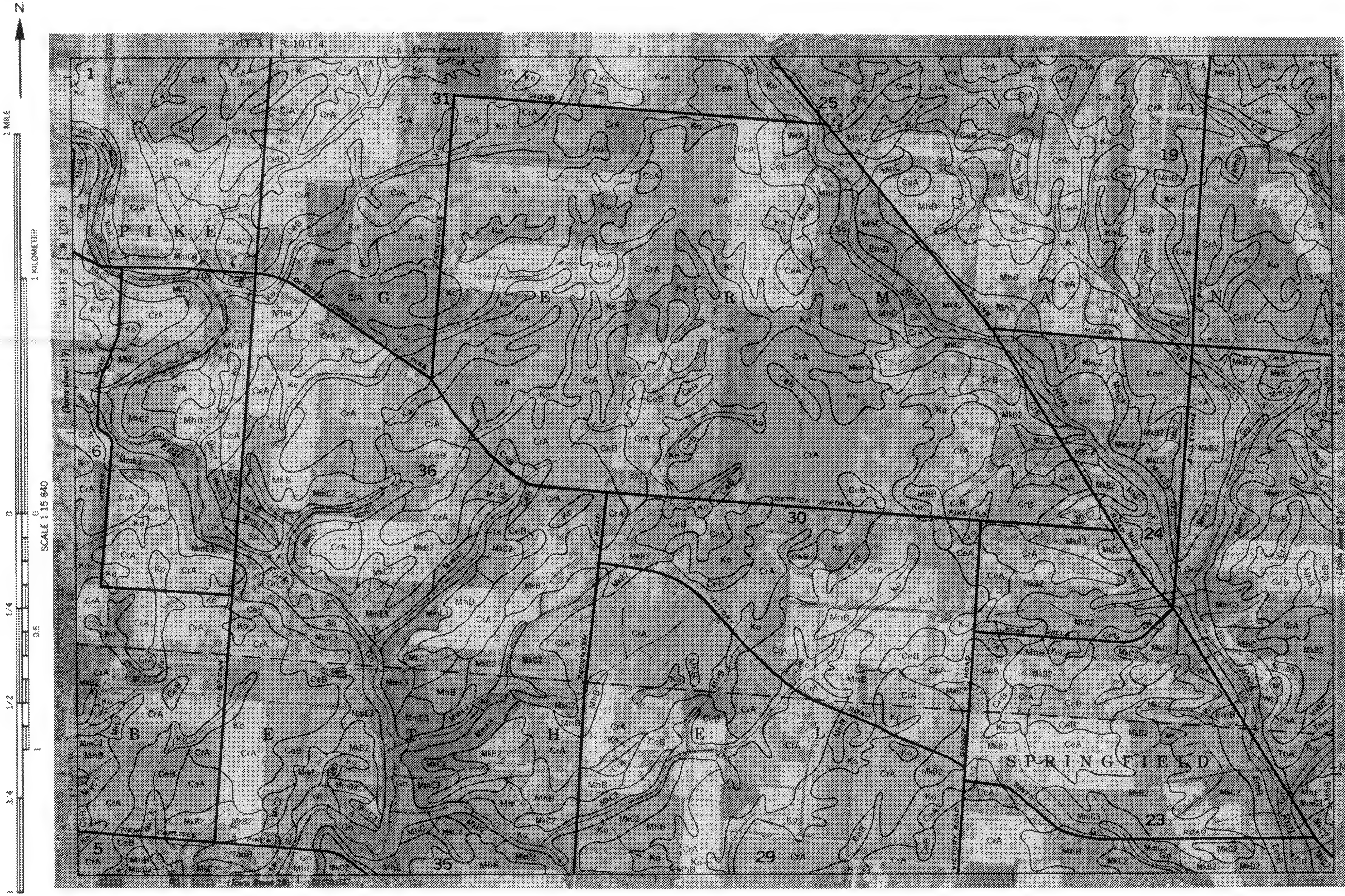
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1965 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 19

20



CLARK COUNTY, OHIO NO. 20

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

21

N

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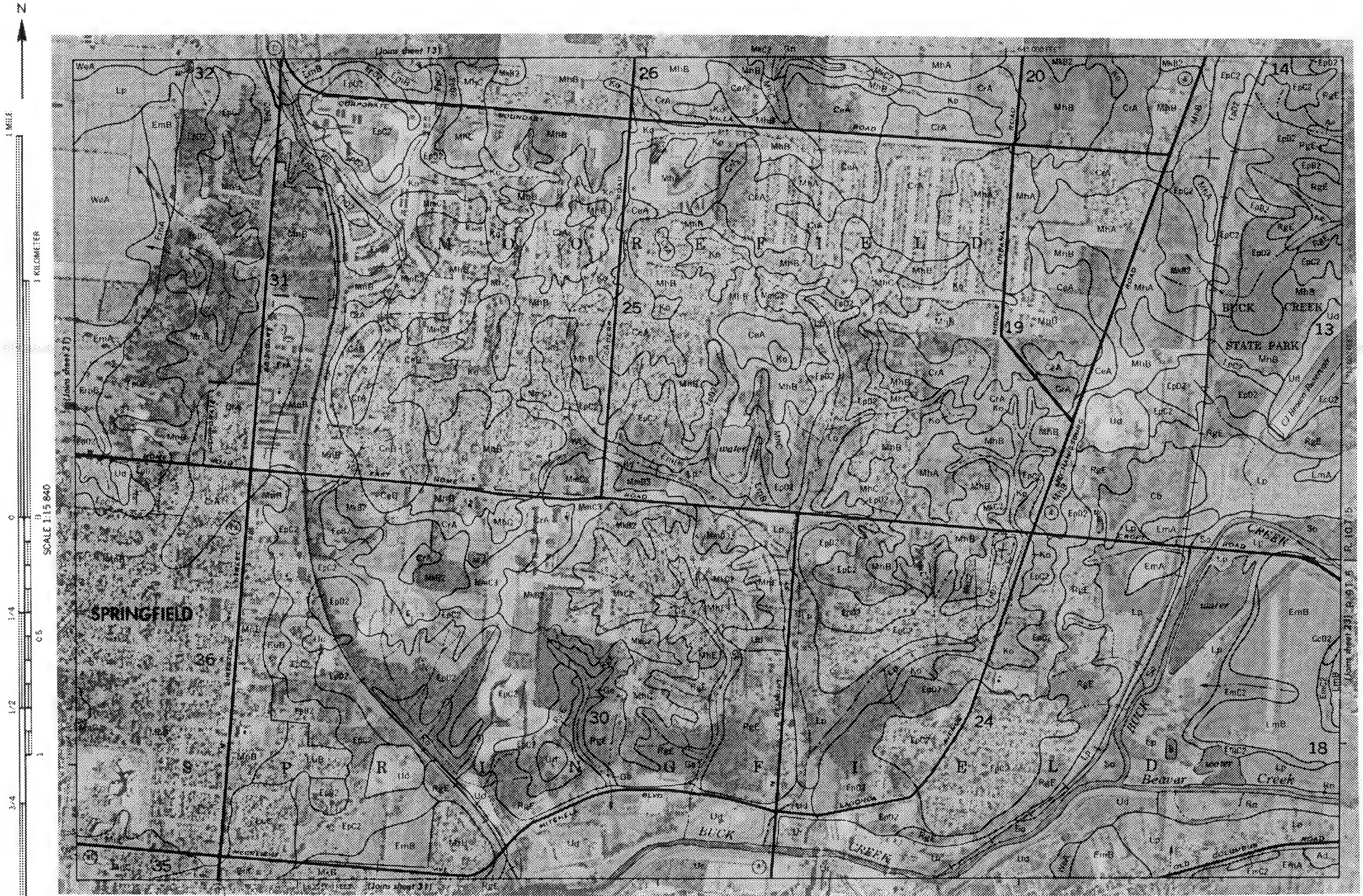
CLARK COUNTY, OHIO NO. 21



CLARK COUNTY, OHIO NO. 22

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

23

N

1 MILE

1 KILOMETER

SCALE 1:15 840

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CLARK COUNTY, OHIO NO. 23

CLARK COUNTY, OHIO NO. 24

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25

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial o[illegible]try. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 25

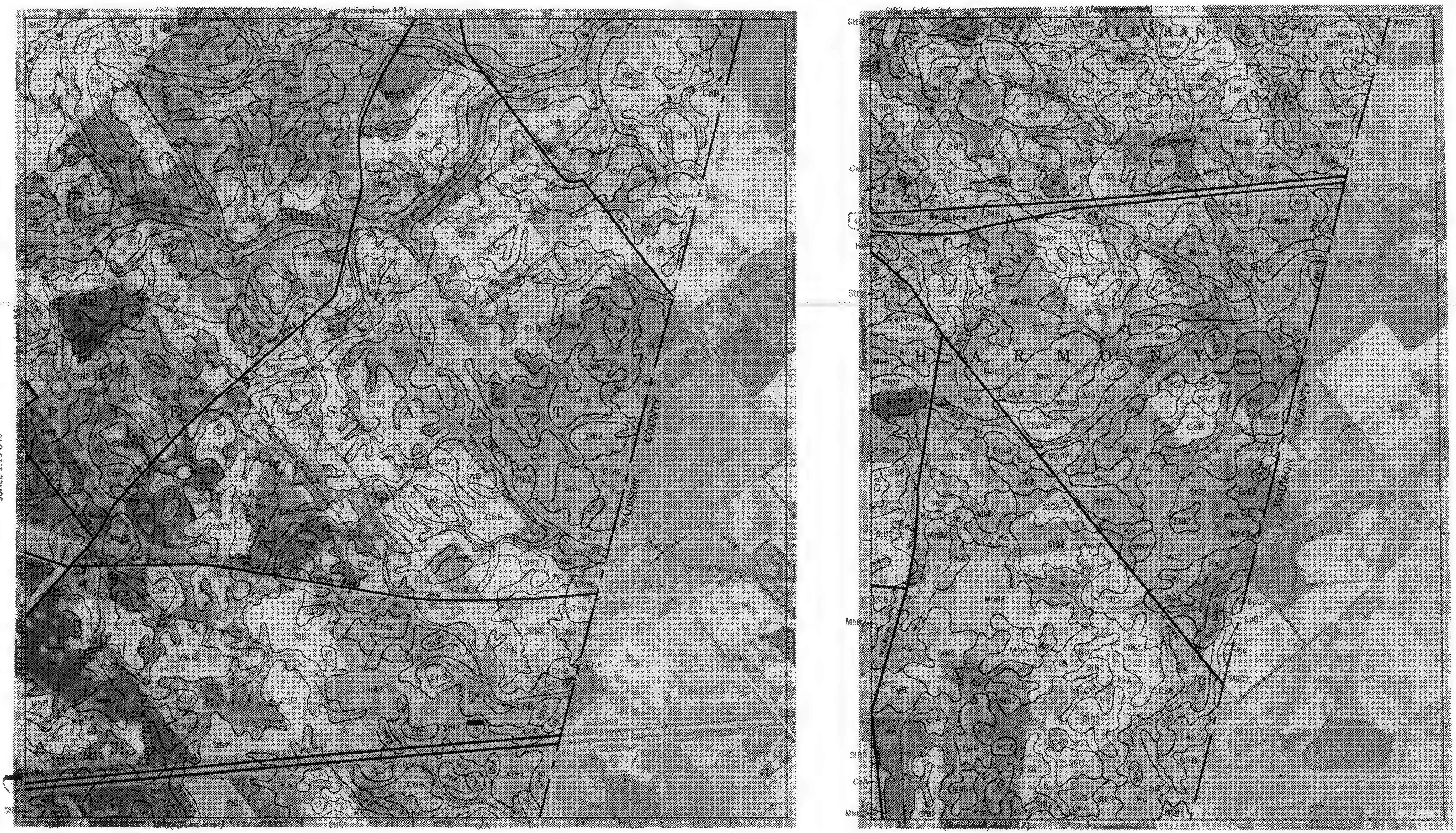
26

N

1 MILE

1 KILOMETER

SCALE 1:15 840



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CLARK COUNTY, OHIO NO. 26

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CLARK COUNTY, OHIO NO. 27

CLARK COUNTY, OHIO NO. 28

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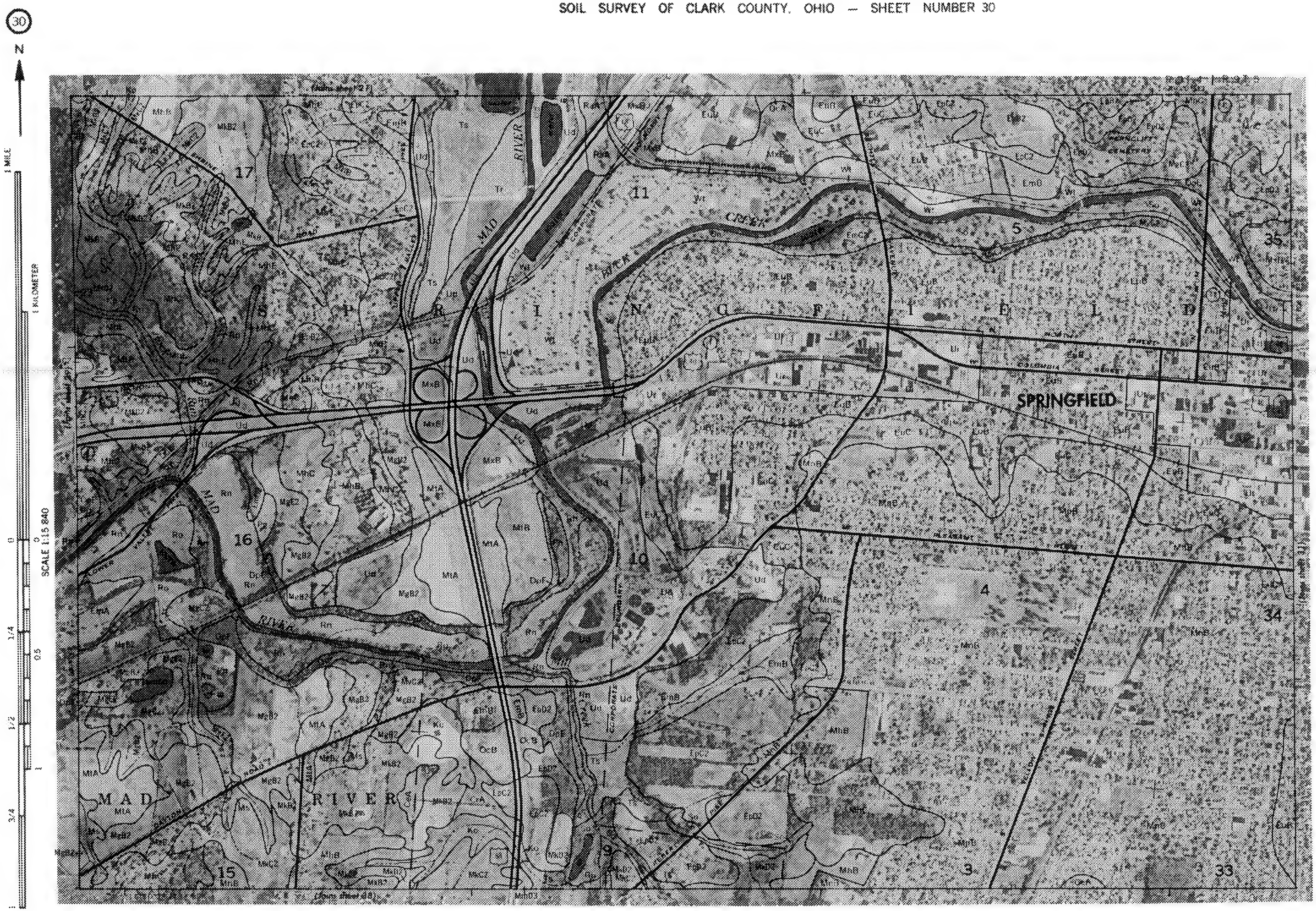
CLARK COUNTY, OHIO NO. 29



CLARK COUNTY, OHIO NO. 30

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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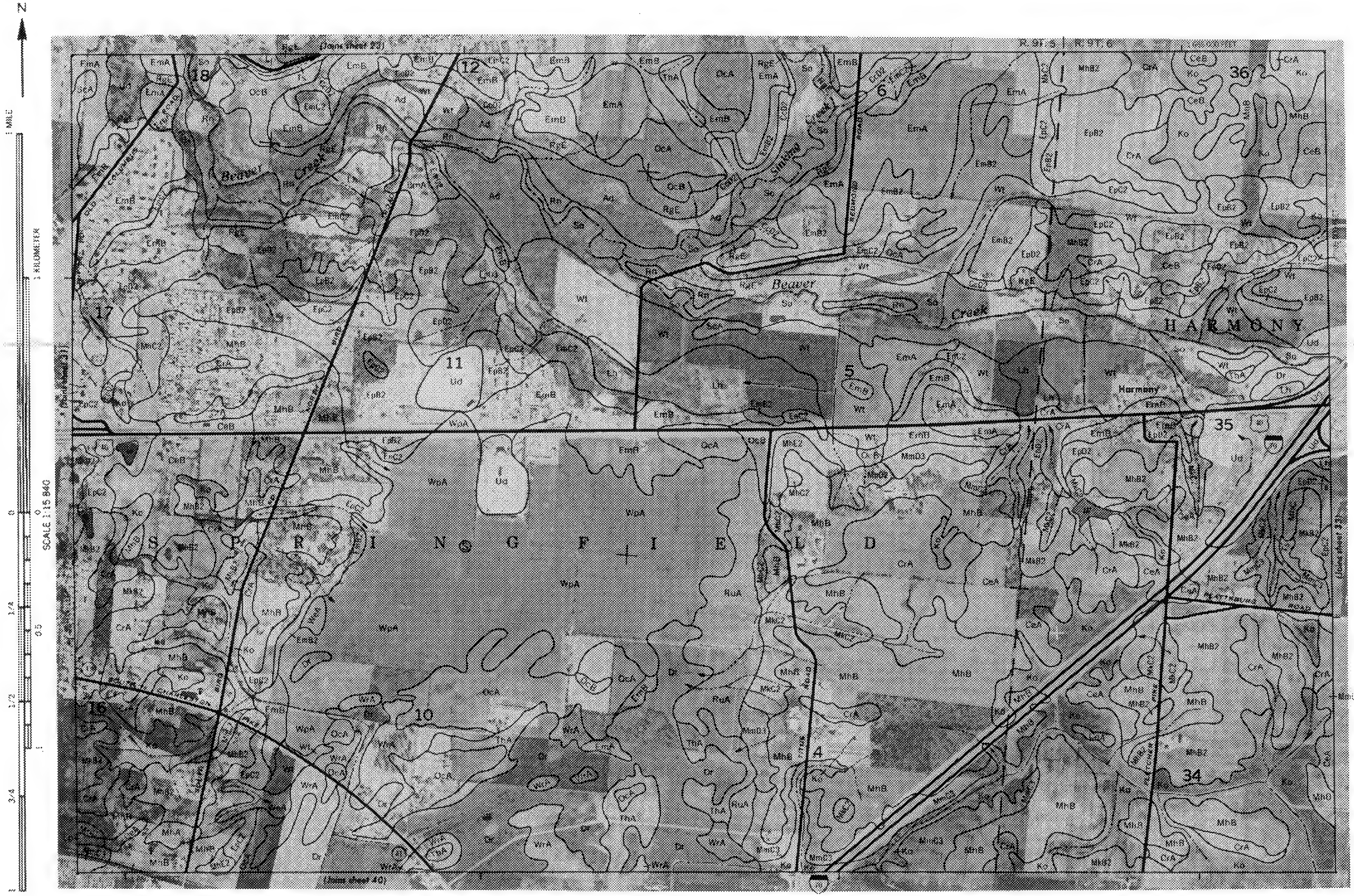
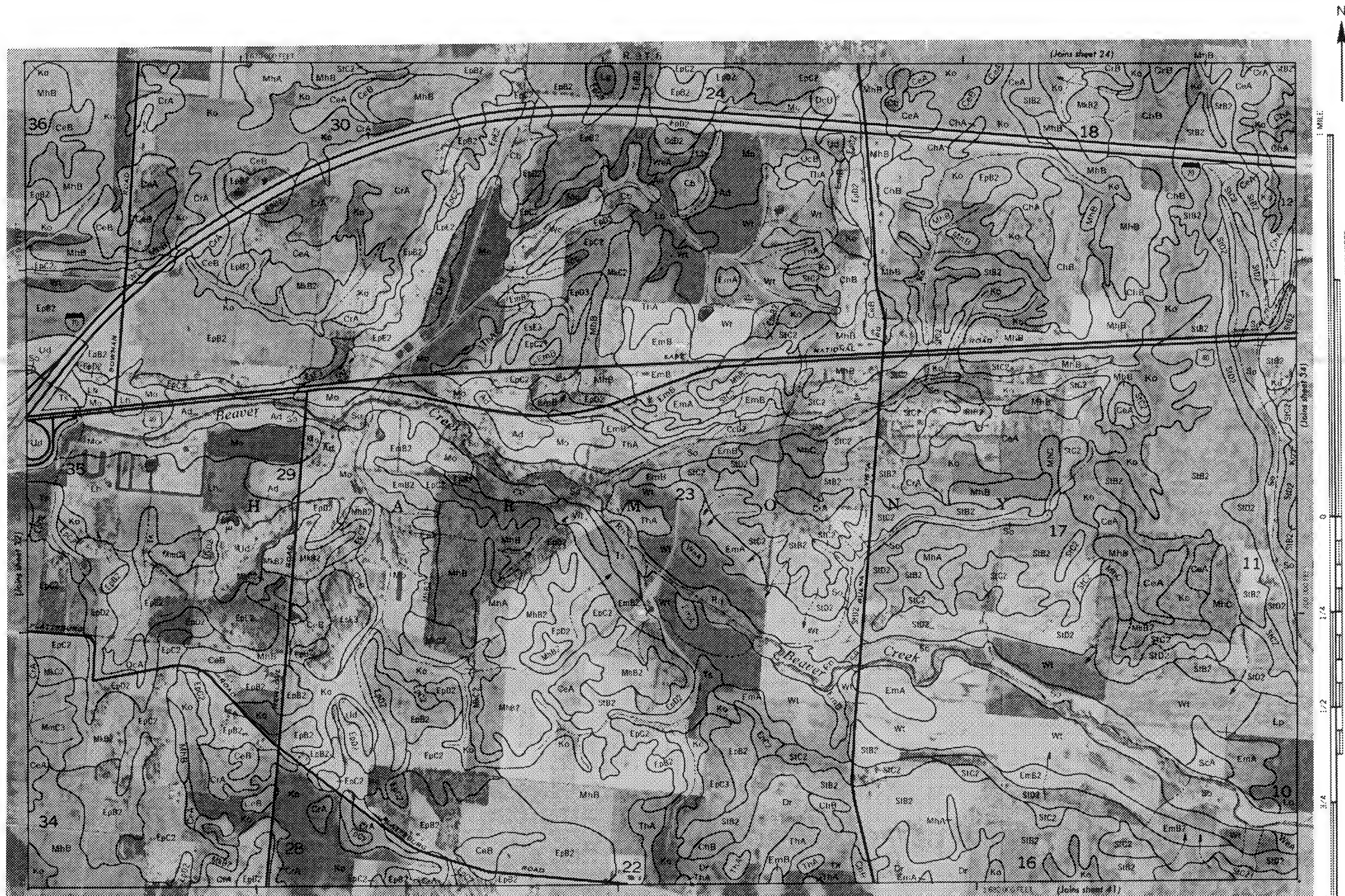
CLARK COUNTY, OHIO NO. 31



CLARK COUNTY, OHIO NO. 32

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

33



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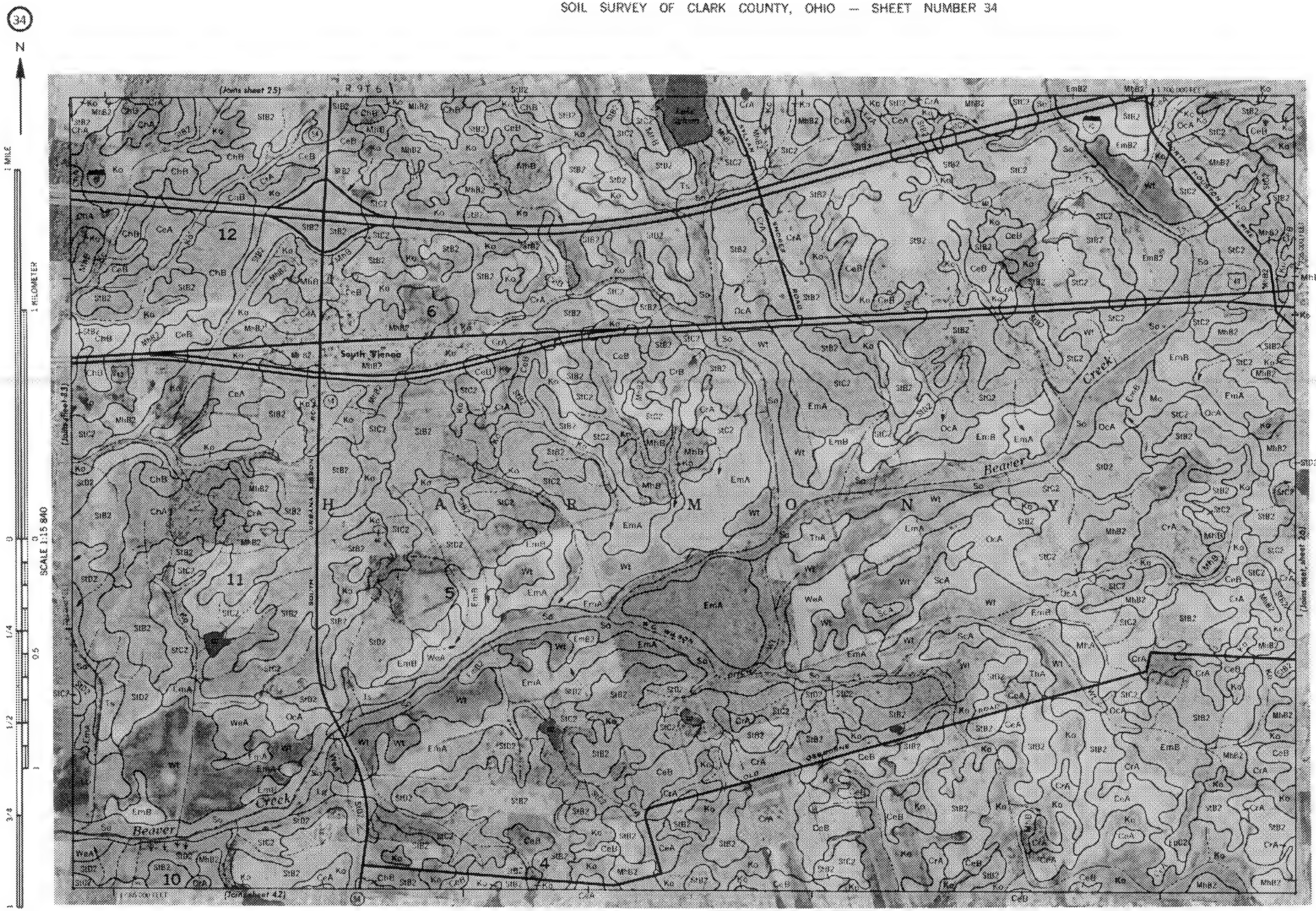
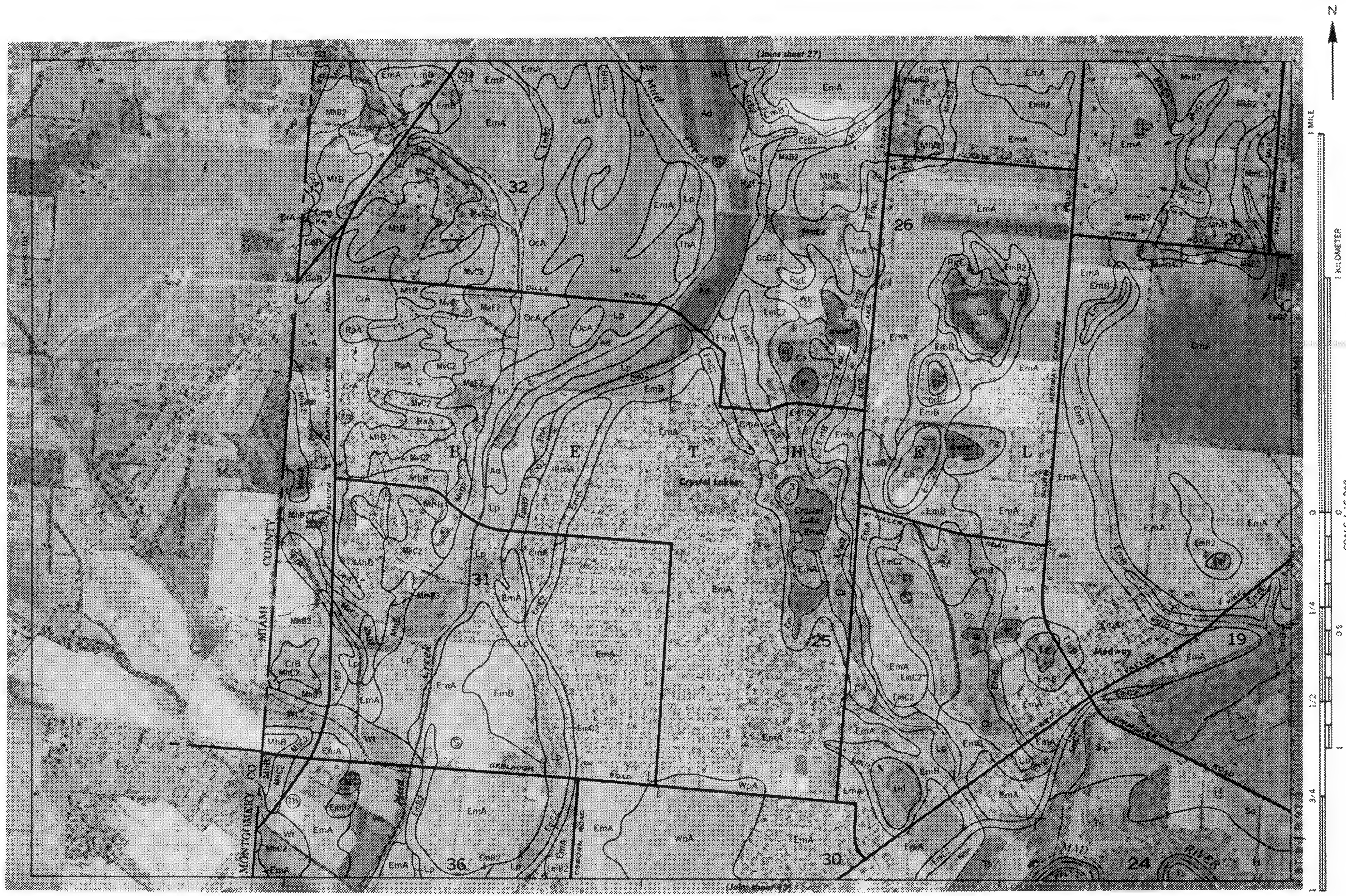
CLARK COUNTY, OHIO NO. 33



CLARK COUNTY, OHIO NO. 34

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1965 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 35

36

CLARK COUNTY, OHIO NO. 36

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CLARK COUNTY, OHIO NO. 37

N

1 MILE

1 KILOMETER

SCALE 1:15 840

CLARK COUNTY, OHIO NO. 38

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

39

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

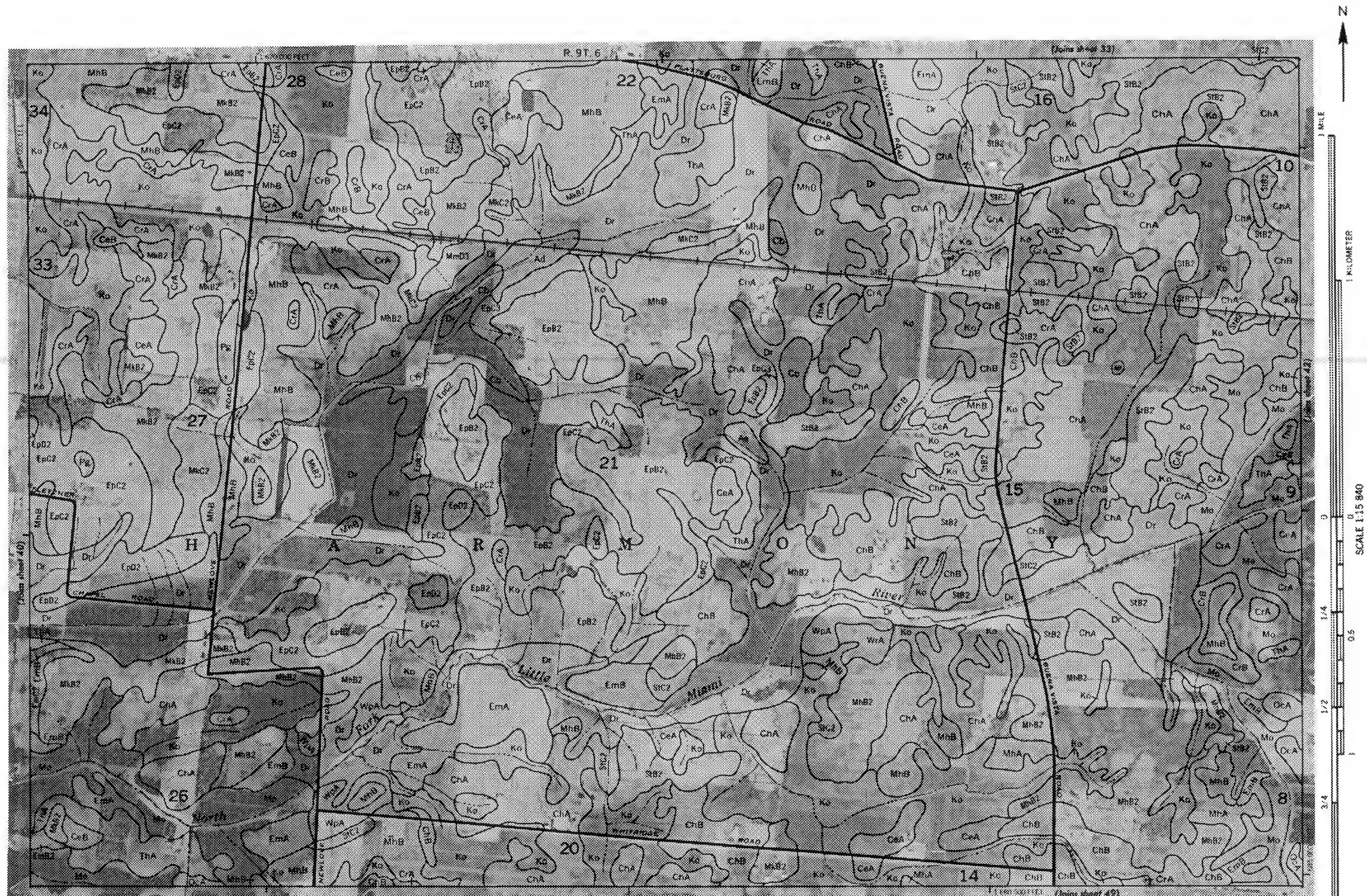
CLARK COUNTY, OHIO NO. 39

SOIL SURVEY OF CLARK COUNTY, OHIO — SHEET NUMBER 40

CLARK COUNTY, OHIO NO. 40

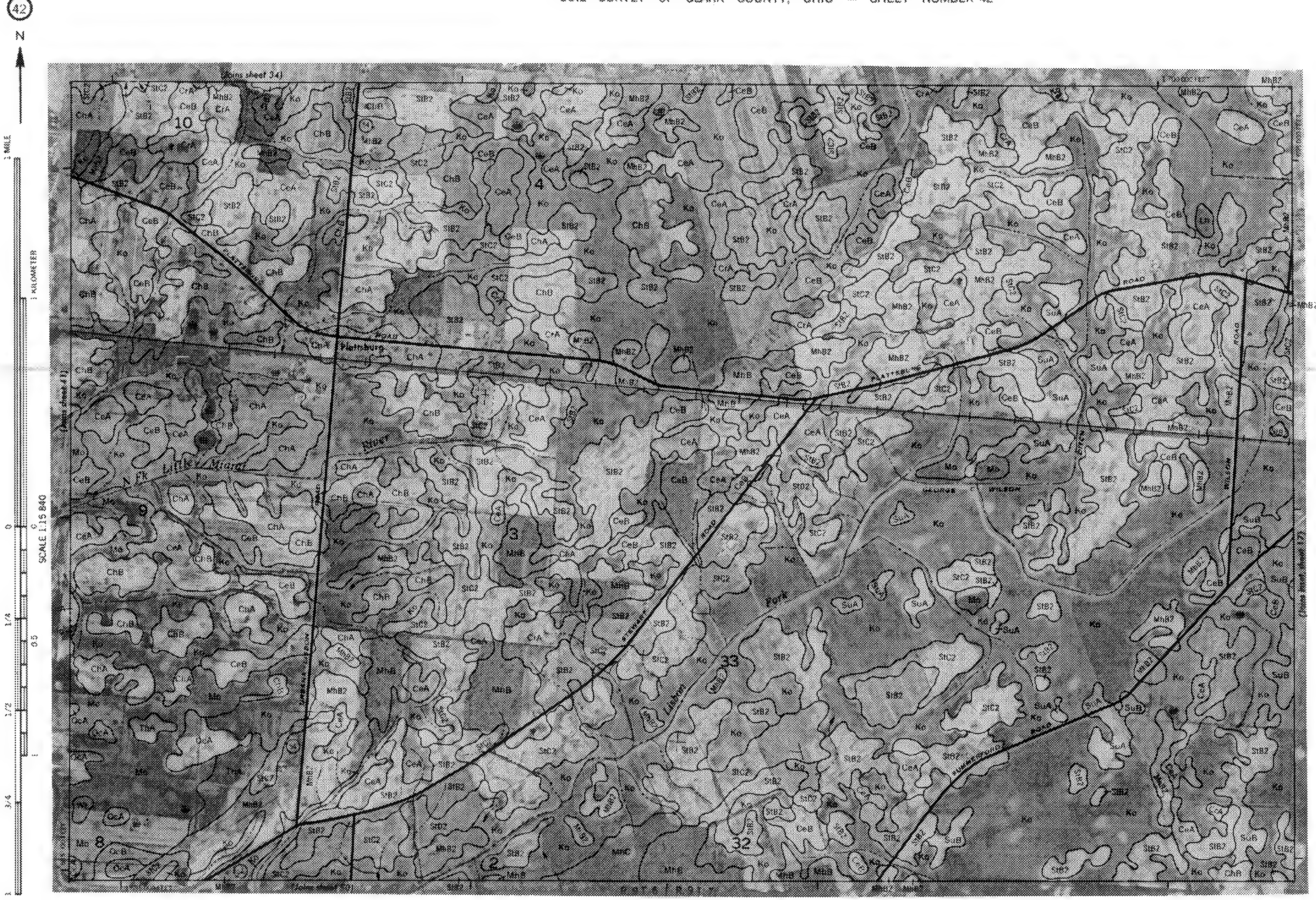
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

41



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 41



CLARK COUNTY, OHIO NO. 42

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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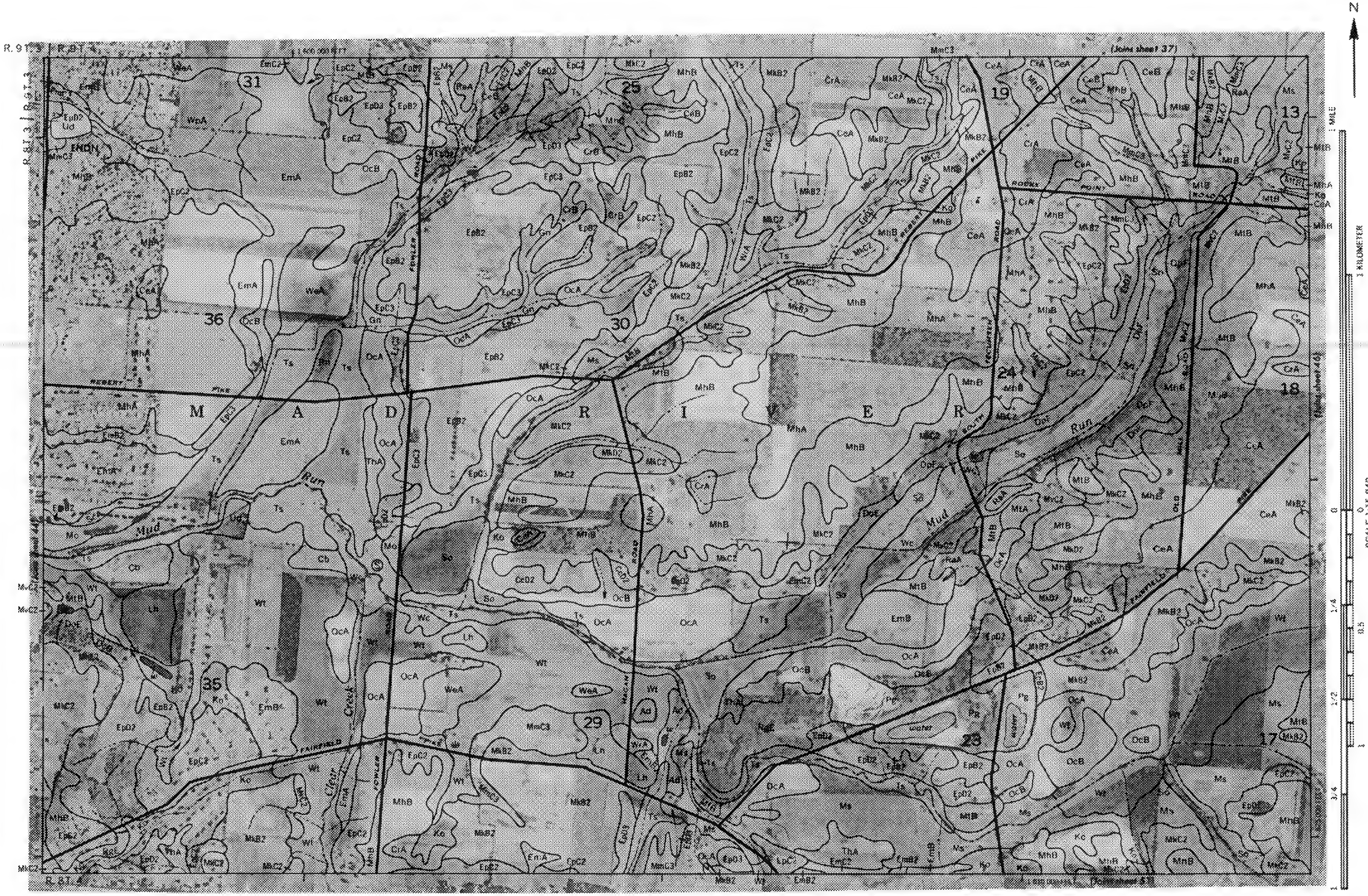
CLARK COUNTY, OHIO NO. 43

CLARK COUNTY, OHIO NO. 44

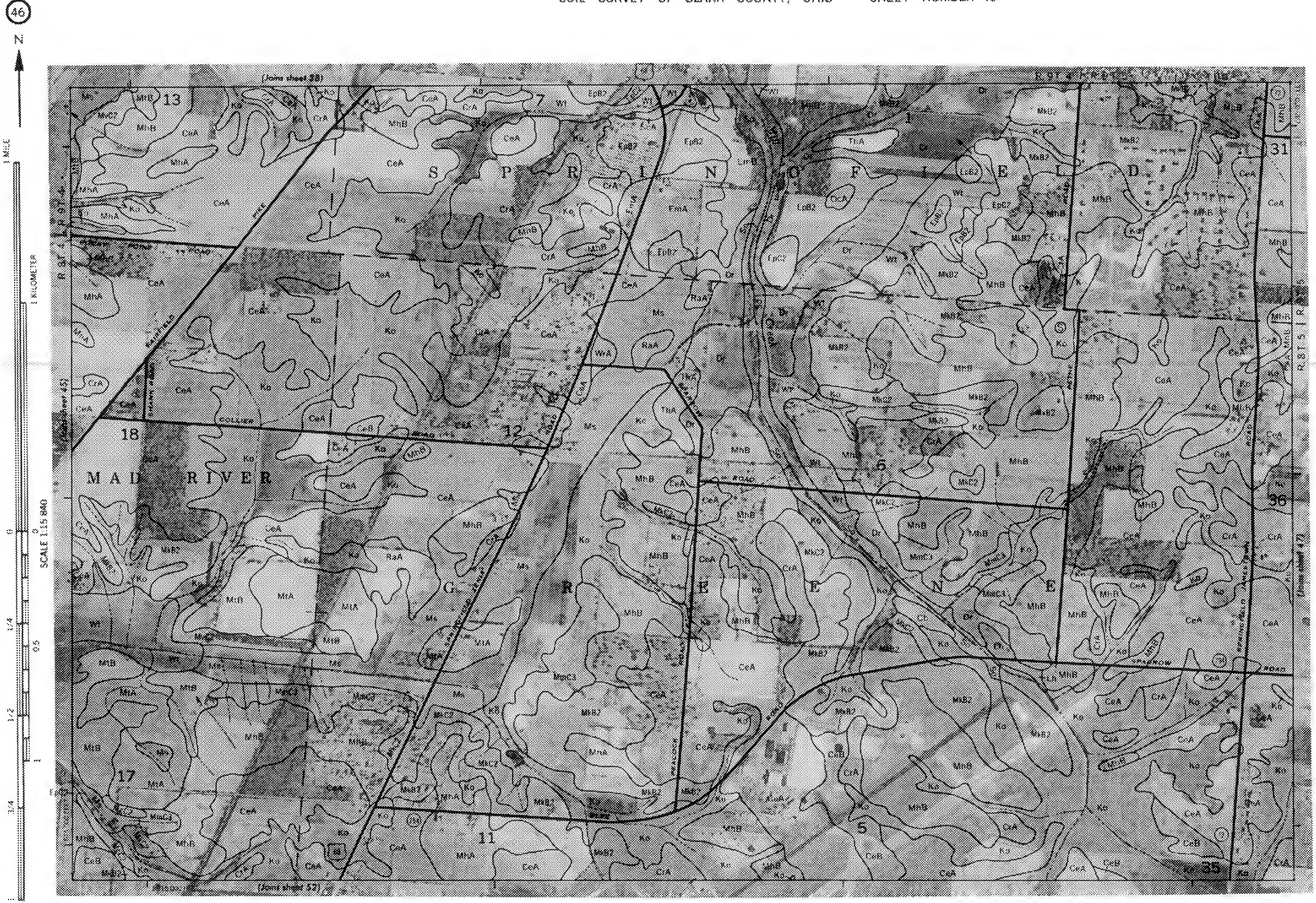
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1980 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

45



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 45



CLARK COUNTY, OHIO NO. 46

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1980 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

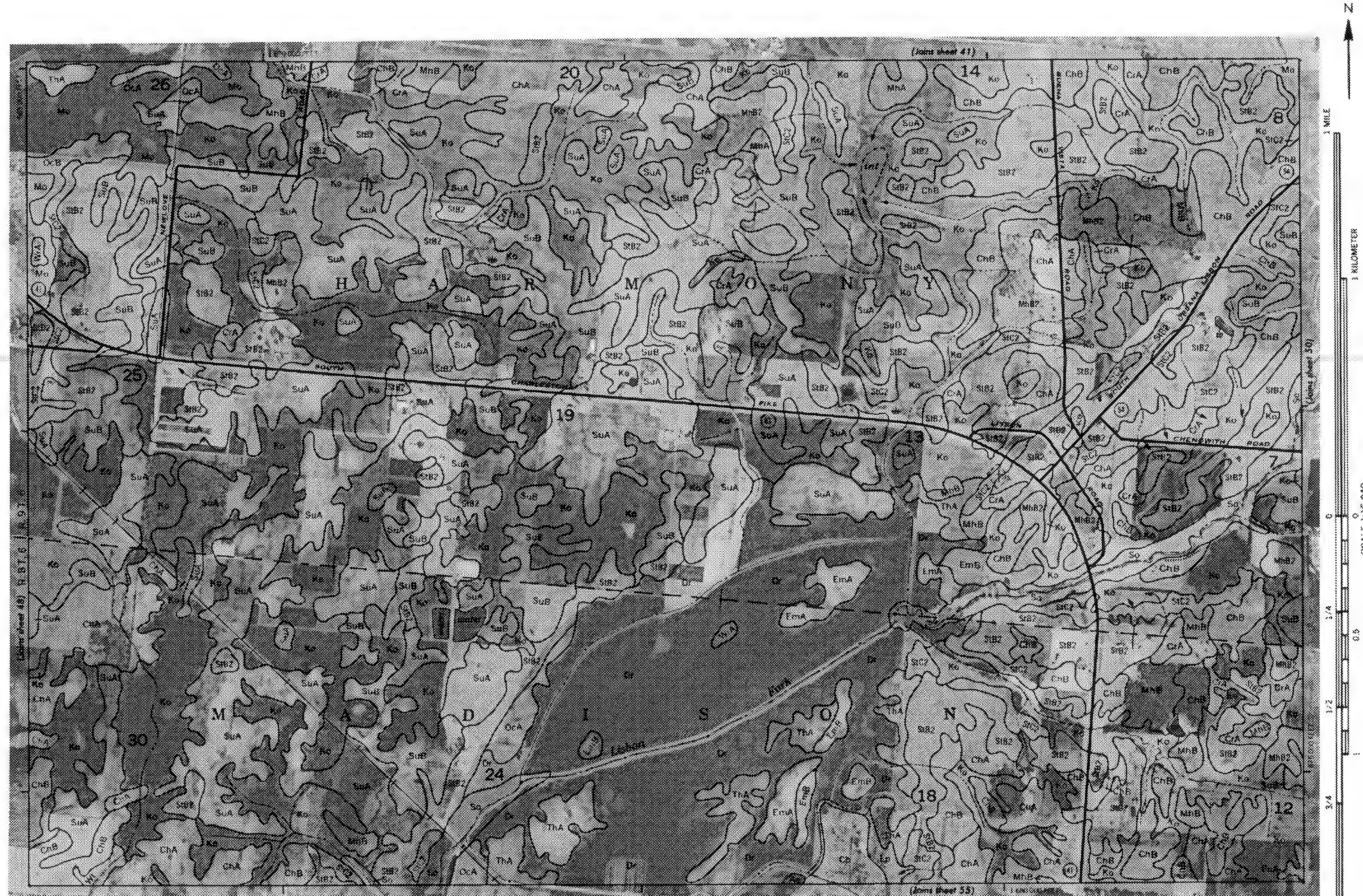
This soil survey map was compiled by the U.S. Departme[illegible] Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial ph[illegible]aphy. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 47

48

CLARK COUNTY, OHIO NO. 48

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

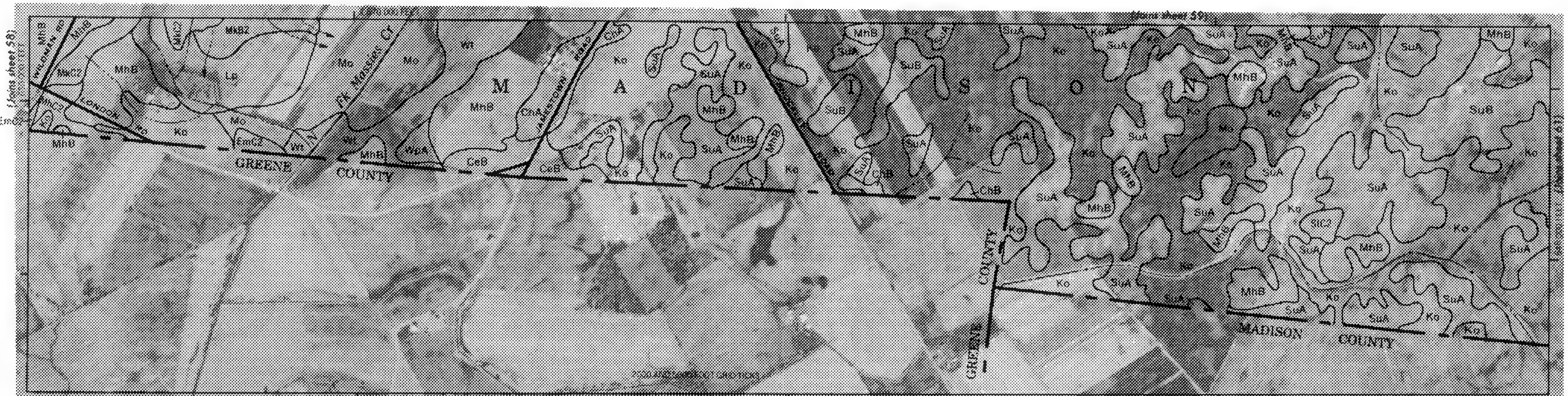


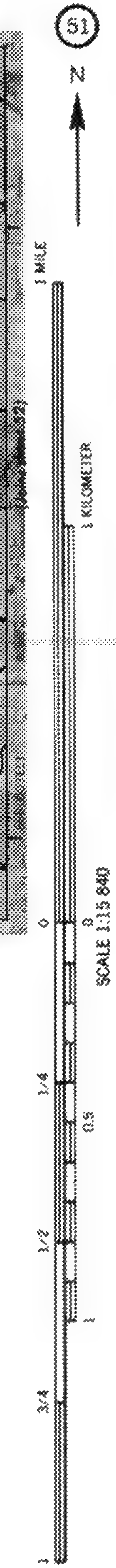
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 49

50

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





This soil survey map was compiled by the U.S. Departme[nt of] Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial pho[to]graphy. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CLARK COUNTY, OHIO NO. 52

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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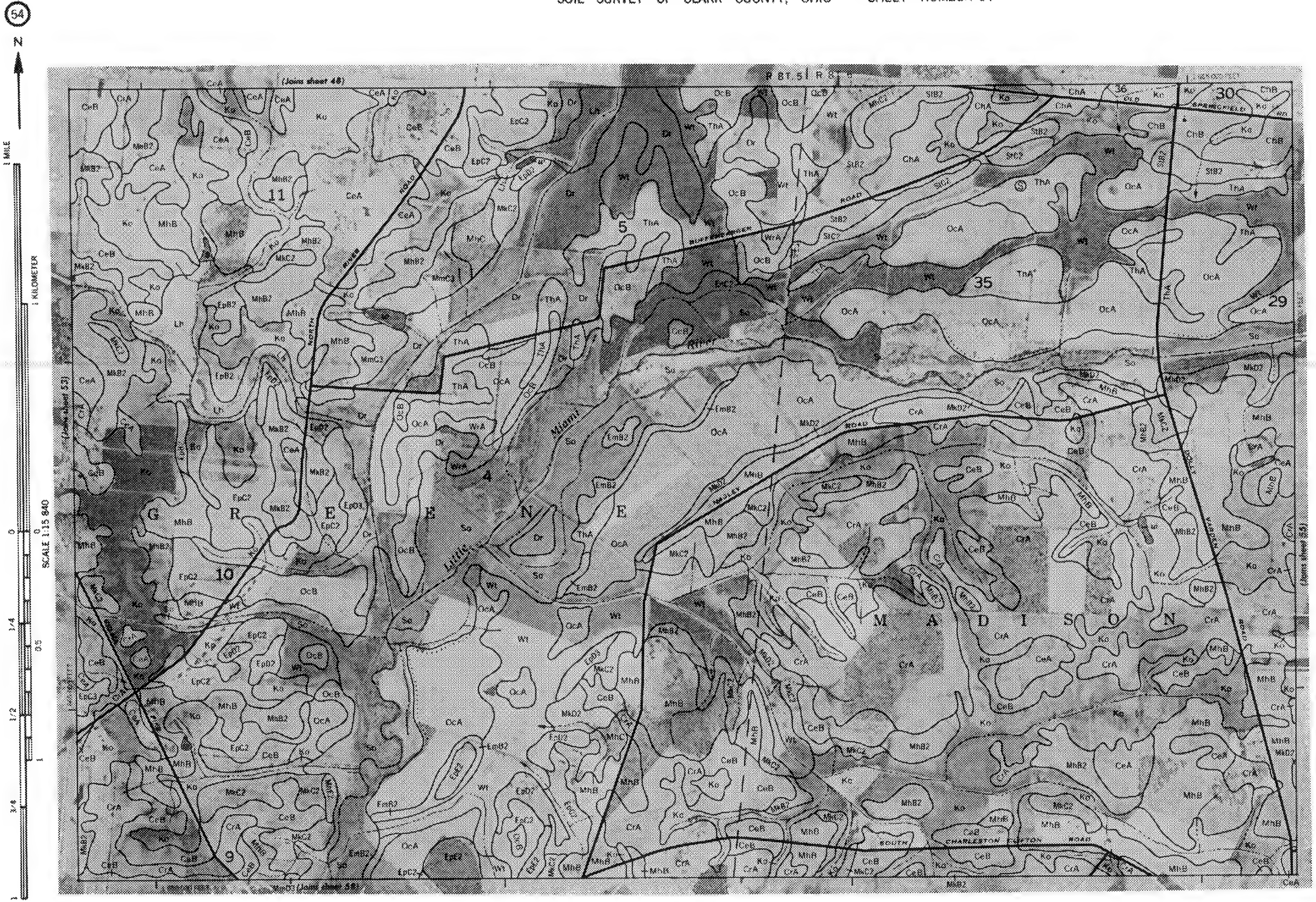
CLARK COUNTY, OHIO NO. 53



CLARK COUNTY, OHIO NO. 54

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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CLARK COUNTY, OHIO NO. 55

CLARK COUNTY, OHIO NO. 56

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CLARK COUNTY, OHIO NO. 57

SOIL SURVEY OF CLARK COUNTY, OHIO — SHEET NUMBER 58

CLARK COUNTY, OHIO NO. 58

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

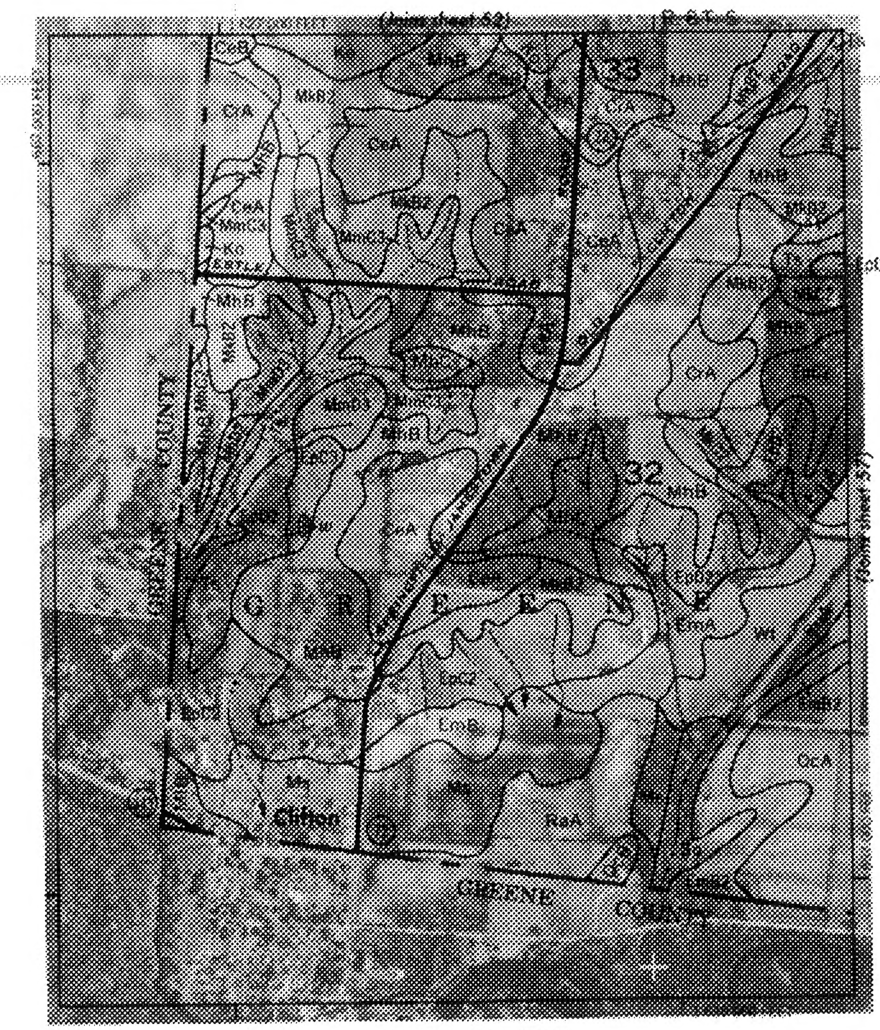
59

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared from 1985 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

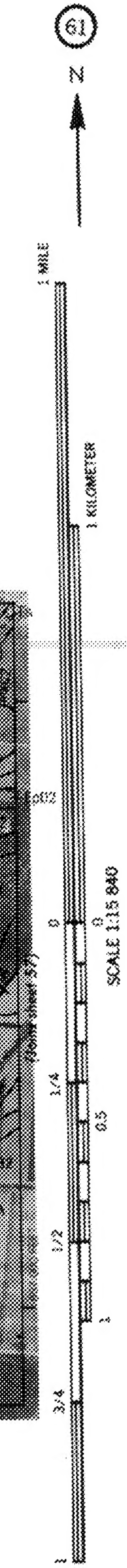
CLARK COUNTY, OHIO NO. 59

CLARK COUNTY, OHIO NO. 60

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1965 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



3000 AND 5000-FOOT GRID TICKS



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1986 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.